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MEMOIRS

OF THE

TORREY BOTANICAL CLUB

VOLUME XVI

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A contribution to our knowledge of Arisaema triphyllum

F. L. Pickett

(WITH PLATES 1–5 AND 70 TEXT FIGURES)

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INTRODUCTORY

Arisaema triphyllum (L.) Schott (TEXT FIG. 1) is one of the most common as well as most widely distributed of the aroids. As such it would seem profitable to give it more attention than has been given. The present work is the result of an attempt to bring together and check up what has been reported, to complete fragmentary parts of reported history, and to call special attention to any features new or unique. It is not the intention to enter into any theoretical discussion, but to present facts as observed. The work has extended over a period of six consecutive

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years. Findings have been checked up by observation of two or more years in nearly every case. Almost three thousand plants have been under observation in the field during this period, and

FIG. 1. A clump of "Jacks" showing general habit. × ⅓ (about).

nearly two thousand plants have been grown in cultures under controlled conditions. The data presented, unless otherwise stated, may be considered as true of plants in Monroe County,

Indiana, and should be compared with those from other sections with due allowance for differences in climatic conditions.

TIME OF DEVELOPMENT OF FLOWERS

That the flower buds of many early blooming perennial herbs are formed during the season preceding their appearance has been long known. In the case of *A. triphyllum* this fact was reported and some structural details given by Foerste in 1883 (10). In another paper, in 1891, Foerste (11) again speaks of the development of the buds of *A. triphyllum* and sets the earliest date for finding of the bud and flower as the "middle of August," for plants growing in the vicinity of Rutland, Vermont.

No description need be given here other than the statement that the flower bud together with the undeveloped leaf or leaves lies (TEXT FIG. 2; PLATE 4, FIG. 56) on the morphological tip of the corm directly under the bases of the season's leaves, and is surrounded by three or more close, sheathing, fleshy scales, the whole forming the terminal bud. In southern Indiana considerable variation is shown in the time of flower bud formation. Specimens collected during the last week of June frequently show flower clusters sufficiently developed for the recognition of individual anthers or ovules. Some specimens collected at this time show sporogenous tissue clearly differentiated. By the first week of August nearly all the plants except those having fruit clusters have withered and died. Examination of corms at this time shows most of the buds well developed. Many ovules show the primary archesporial cell and many anthers, all stages up to well-formed pollen spores. In marked contrast to the conditions just noted, a considerable number of corms examined in late summer show nothing but bud initials, neither leaves nor flower buds being evident. This is equally true of plants which have borne staminate and pistillate flowers during the current season.

FIG. 2. Bud from a 90 gm. corm, removed August 14. × 3.

Whether or not these plants would bear flowers the following year cannot be determined with certainty; but the finding of an occasional plant in March or early April showing active tetrad divisions indicates the probability that such plants pass the winter with the buds very immature. The wide variations just noted have been observed both in the greenhouse, where all the plants of a group have received identical treatment, and in the field.

Of the accessory floral structures the spathe develops first, and shows the appearance of a miniature but otherwise perfect envelope (TEXT FIG. 2) before the reduction division of the pollen mother cells or the investment of the nucellus by the integuments. With the resumption of activity in the spring the spathe grows rapidly, as a leaf, and is mature before the flower breaks through the soil. The sterile club of the spadix appears as a small conical protuberance above the flower clusters when the individual anthers can first be recognized, and makes its chief growth after the spring development begins. Its mature form is not attained until the flowers are fully developed.

As would be expected from the great difference in the time of development of the flower parts, there is much variation in the time of maturity of the inflorescence. If March be mild and warm, a few "Jacks" may be seen during the first week of April. Most of the plants are in full bloom during the last week of April and the first half of May. A few fresh flower clusters may be found during the first week of June.

It has been observed that the first flowers to appear are staminate. All through the season the staminate spikes are found mature before the pistillate spikes of plants in the same group. Even more striking is the difference in time of maturity of flowers on mixed spikes. On the spikes where the oldest ovule shows a megaspore mother cell with a resting nucleus, anthers with completed tetrads have been found. On older spikes anthers discharging spores have been found with ovules showing tetrads of megaspores or the germination of such.

THE STAMINATE FLOWER AND MICROSPORE

The staminate spike is 5–10 mm. long and its axis 2–4 mm. in thickness, being rather more slender than that of the pistillate

spike. The flowers are contiguous before dehiscence, and sometimes show a somewhat spiral arrangement. Each flower is composed of a nearly sessile group of one to six yellow, purple, or mottled anthers, whose filaments are entirely confluent. The anthers are crescent- or U-shaped. They are usually arranged in pairs with the concave sides together; but in case of odd-numbered groups, this arrangement is lost. In some cases the groups are borne on pedicels as much as 2 mm. long, a condition common among staminate flowers at the top of a pistillate spike (PLATE 4, FIG. 59). In his brief discussion Rowlee (25, p. 369) described the filaments as cohering, and the anthers as simple in structure. The meaning of this statement is not quite clear. The writer finds a tendency of the anthers to be two-celled. There are always at least two groups of primary archesporial cells, which in many anthers are confluent long before the pollen mother cells are formed. In other anthers the locules remain distinct almost up to the time of dehiscence (PLATE 2, FIG. 29).

At the time of preparation for the heterotypic division of the pollen mother cells, the sporangium wall is composed of a single epidermal layer and three or four layers of sterile cells. The two outer layers of sterile cells form the wall proper, and the one or two inner layers are clearly differentiated as tapetum. The mature sporangium has a wall composed of an outer layer of epidermis, an inner layer of partly disorganized sterile cells, and between these two, a third layer composed of palisade-like cells with thickened walls (PLATE 2, FIG. 29).

The two divisions of the pollen mother cell are as in the lily. The first division is followed by the formation of a wall before the second begins. All the cells of one locule show about the same stage of development; although the different flowers of one spike may at one time show all stages from resting nuclei to mature pollen spores. In 1899 Atkinson (2) studied the details of the reduction division. The writer has nothing to add at this time, as questions of a purely cytological nature are out of the realm of the present work. The second division has not been studied in detail, but an examination of the preparations at hand has shown nothing unusual. As reported by Atkinson (2, p. 5) the gametophytic nuclei show sixteen chromosomes. The tetrad is spherical with

the dividing walls in various intersecting planes. Soon after the completion of the second division the spores round off and separate.

The first division of the pollen spore nucleus does not occur until the walls are well formed. The generative cell is isolated by the formation of a delicate wall. The second division occurs just about the time of germination. The mature pollen spores are spherical with an average diameter of 19 microns. Both intine and exine are well developed, the latter being quite firm, without evident pores, and thickly set with short, slender spines.

The germination of the pollen spore and the peculiarities of the pollen tube have been briefly described by Rowlee (25). In the examination of pollen germinated on fresh stigmas, the writer has found that the pollen tubes rarely grow straight but tend to become twisted or folded, although to a less extent than found by Rowlee in the case of spores germinated in an anther cavity. The tube winds about among the outer stigmatic hairs, through the hollow style, and then among the hairs of the inner stigmatic brush before reaching a micropyle.

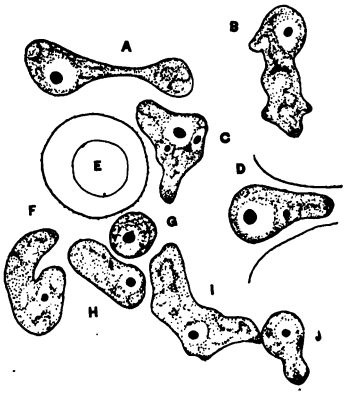


FIG. 3. Migrating tapetal nuclei. × 210. *G*, a quiescent stage common among almost mature pollen spores. *E*, pollen spore drawn for comparison of size. *D*, nucleus from younger locule showing entrance between two tetrads. Other figures show amoeboid forms suggestive of movement.

An interesting point in connection with the pollen spore formation is the appearance of wandering tapetal nuclei, as described by Duggar (9) for *Symplocarpus foetidus*. Just at the beginning of the second tetrad division, the tapetal cells begin to disorganize by dissolving their walls. When the pollen spores begin to round off and separate, nearly all the tapetal cells have lost their walls, and the protoplasm and nuclei have passed out into the mass of spores. The protoplasm appears as a nearly homogenous mass, with faint vacuoles, surrounding the developing spores. The nuclei have enlarged, and become rather densely granular, with distinct nucleoli and vacuoles

(TEXT FIG. 3). Whether these nuclei move about in the fluid mass or are carried among the spores by the movement of the protoplasm escaping from the tapetal cells has not been determined, but the forms of the nuclei and their even distribution seem to indicate individual movement. That these free nuclei perform some life function is indicated by their persistence up to the maturity of the pollen spores.

THE PISTILLATE FLOWER

The pistillate flowers arise as broad, contiguous protuberances on the lower portion of the short conical tips of the central axis (TEXT FIG. 4). The development of the ovary wall and the

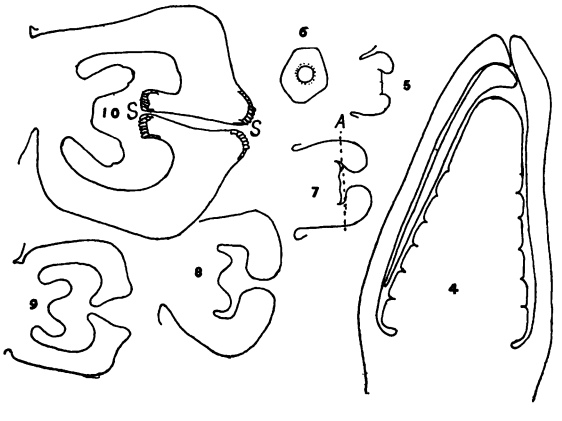


FIG. 4. Longitudinal section of young pistillate spike showing flower fundaments only.

FIGS. 5, 7, 8, 9, 10 show in diagram, successive stages in development of ovary.

FIG. 6 is a cross section of 7 through *A*.

FIG. 10 represents a longitudinal section of an almost mature ovary, showing the beginnings of the stigmatic hairs at *S*. All × 30 (nearly).

beginning of the ovules is shown in TEXT FIGS. 5–10. A section of a mature ovary is shown in PLATE 2, FIG. 33. The one to six orthotropous ovules develop from a small basal placenta. The placenta represents in this case the end of the branch axis, and the ovules, when more than one, seem to be lateral outgrowths. As the ovary wall closes above the cavity the margin is broadened and flattened so that the lower edge closes first, leaving a funnel-like opening (TEXT FIG. 9). Continued growth of the wall and of

the upper edge narrows this opening and so produces a kind of hollow style (TEXT FIG. 10).

About the time the opening in the style reaches its smallest size, the epidermal cells at the upper and lower margins begin to elongate, forming first papilla-like outgrowths (TEXT FIG. 10), and then long, club-shaped hairs (PLATE 2, FIG. 33). Rowlee (25) described and figured the stigma of *A. triphyllum*. Briefly stated, the two stigmatic tufts, one inside and one outside the ovary, are similar, being composed of long, club-shaped hairs without septa. The outer hairs of each tuft are the longer, the central ones shorter until in the tube of the style they are mere papillae (PLATE 2, FIG. 26). The hairs of the inner tuft are similar in form, but a few of them become filled with a waxy substance just before maturity (PLATE 2, FIG. 24). These wax cells break down, and the wax, diluted, spreads through the upper part of the ovary, between the ovules and into the micropyles as a thin slime (PLATE 2, FIG. 33). At first glance the presence of this slime might be taken as an adaptation facilitating the passage of the pollen tube from the stigmatic brush to the micropyle. But the fact that cases have been observed where fertilization has taken place without the breaking down of the wax cells or the presence of any slime in the cavity discredits such a theory and leaves the use of the cells a question.

The development of the ovule has been described by the author (20), and as it shows no unusual features will be given but brief mention here. Two integuments are formed, the first appearing about the time the archesporial cell is differentiated. When the megaspores are mature the nucellus is entirely invested by the two integuments whose masses of enlarged cells form massive walls about the micropyle. The condition of the integuments about the micropyle is shown in PLATE 2, FIG. 27, almost the same as at the time of maturity.

The mature flower consists of a single ovary attached by a very short stem to the axis of the spadix (PLATE 2, FIG. 33). The ovaries are arranged in a more or less regular spiral order in the spike and are crowded together from the beginning so that they are polygonal in section (PL. 4, FIG. 59; TEXT FIG. 6). The crowded condition continues through the development of the fruit, leaving the berries with flattened sides.

THE EMBRYO-SAC

The development of the embryo-sac of *Arisaema triphyllum* was first studied by Strasburger in 1879 (26). Later Mottier (18) and Gow (13) worked out most of the details in the development of this structure. In 1913 (20) the writer reviewed the earlier work and made some additions and corrections. For the sake of continuity the findings of that work will be briefly restated here.

One to four megaspore mother cells are formed independently in the hypodermal layer of the ovule tip. Each of these may produce a tetrad of potential megaspores. One or more of these megaspores may germinate and produce a typical eight-celled embryo-sac. More than one embryo-sac may be formed in each nucellus. The fusion of the polar nuclei is doubtful. The antipodal cells rarely develop fully as in typical angiosperms.

The points of this part of the history worthy of further attention are as follows. As already stated, a regular tetrad of megaspores, variously placed, is formed. Later work has shown that these megaspores are potentially the same, and that even when more than one tetrad is formed many from the plural groups may germinate (PLATE I, FIG. 1). There is no rule of precedence in later development, the matter of quickness of starting and rapidity of growth giving some one spore, as a rule, advantage over the others. One striking example of the precedence of the lowest spore of each of two tetrads has been observed (PLATE I, FIG. 2), but the consideration of this as a regular order is prevented by the many cases where the uppermost or some of the intermediate spores develop into the embryo-sac. That one megaspore usually develops first and at the expense of the others is, of course, indicated by the common formation of but one embryo-sac; while occasional appearance of plural sacs in a nucellus proves the possibility of the growth of more than one spore.

At the time of publishing the earlier paper investigations were under way to determine definitely the action of the polar nuclei and the fate of the antipodal cells. The flowers of another season have been examined since that time, more than two hundred preparations showing approximately mature embryo-sacs having been made. The following seems to be the usual course of events. The two polar nuclei float about for some time in the embryo-sac

cavity, enlarge in size, and finally fuse near the chalazal end. That the nuclei always fuse seems certain from the examination of many preparations showing the nuclei in contact and in partial fusion. The idea is made more certain by the fact that no one of many preparations of past mature but sterile embryo-sacs examined show free polar nuclei. A wide difference in the position of the nuclei at the time of fusion has been noted in a few cases. In one instance the contiguous nuclei were near the micropylar end, and in five cases they were near the middle of the embryo-sac.

After the fusion of the polar nuclei the endosperm nucleus is almost universally found well down in the chalazal end of the cavity, being in some cases almost in contact with the antipodal cells. A remarkable exception was shown by one embryo-sac in which the fusion nucleus was close beside a synergid.

The three antipodal nuclei sink close to the chalazal extremity of the sac, and are soon surrounded by cell walls (PLATE I, FIG. 4). For a very short time they retain their appearance of living cells; but by the time fertilization takes place, they may be seen as shrunken, deeply staining masses pressed close in the chalazal extremity. With the activity of the vegetative nucleus in the residual cavity and the accompanying disorganization of the lower nucellar tissue, the antipodals entirely disappear.

As stated in the former report (**20**, p. 233) a normal egg apparatus (PLATE I, FIG. 5) is formed. Some variations may be worth noting. The synergids sometimes show the principal vacuole above instead of below the nucleus. In some cases (PLATE I, FIG. 3) synergids as large as the egg cell have been observed. A noticeable feature is the frequent occurrence of an egg cell reaching far down into the sac cavity (PLATE I, FIG. 4). In at least one case the egg nucleus was carried to a position near the center of the cavity.

In two preparations from different plants embryo-sacs of mature dimensions were observed, with the primary endosperm nucleus and the shrunken antipodals expected in mature sacs, but showing instead of the normal egg apparatus, the three micropylar nuclei, each inclosed by a mass of protoplasm and a cell wall, floating free in a group in a cell cavity. The similarity of these cells suggests a question as to the primary difference between the synergids and the egg cell and as to what may bring about the final differentiation in the group.

The mature embryo-sac is of the typical monocotyledonous form. It is covered with a cap of nucellar tissue rich in starch, and rests upon a considerable basal mass of the same kind of tissue. Four to eight days may pass between the maturing of the embryo-sac and the withering of the stigma and consequent impossibility of fertilization. During this time the embryo-sac may almost double in size. The greatest change in surrounding tissue to be noted during this time is in the lateral portions of the nucellus. In some cases sacs just mature with fertilized eggs have been found completely invested with a layer of nucellus. In others the last vestiges of lateral nucellus have disappeared before fertilization.

POLLINATION

The pollination of *A. triphyllum* presents a problem which has either escaped the notice of investigators or has baffled attempts at solution. In the case of bisexual spikes where securing pollination would seem to be a simple matter, the staminate flowers mature so long before the pistillate that their pollen is probably inactive when the ovaries are mature. The dioecious character of most of the flowers makes cross pollination necessary. The pollen is slightly adhesive, and being borne deep in the hooded spathe, has practically no chance to be carried by the wind. There are no nectaries or similar structures connected with either staminate or pistillate clusters. In a few spathes insects have been observed eating the stigmatic hairs of pistillate flowers; but this has been observed so few times that the idea of insects coming to the spathes to feed on the stigmatic hairs cannot be entertained. As mentioned in the description of the pistillate flower some of the hairs formed inside the ovary produce a gum which is later reduced to a slimy mass filling the ovary cavity. Whether or not this produces an odor attractive to insects can only be conjectured.

A brief reference to the structure of the two forms of inflorescence will make clearer the observations on insect visitation. The space between the pistillate spike and its spathe (TEXT FIG. 11) is much less than in the case of the staminate spike (TEXT FIG. 12). Such a difference is quite general, although it is not always as great as shown in the figures. In fact, while the staminate spathe may be entered and left again by

small flies and bees without inconvenience or danger, the narrow space around the pistillate spike would make it quite difficult or impossible for the same insects, once in such close quarters, to escape. Observations have proven that many insects find this a veritable death trap.

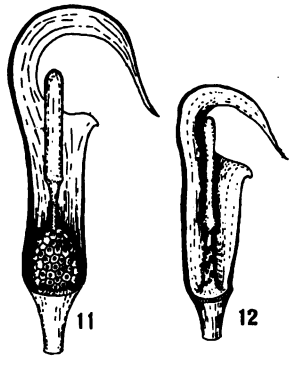


FIG. 11. Longitudinal section through the spathe of a pistillate spike, showing the narrow space about the flower cluster. Reduced about ½.

FIG. 12. Similar section showing comparatively greater space between flowers and spathe wall. Reduced about ½.

With a view of securing some definite basis for a possible explanation of the pollination question, about two thousand plants have been examined and the results with reference to insect visitation tabulated. Different sets of data have been so nearly alike in percentage ratios, that a full account of but one group will be given. From 9–10 A.M. on a bright, warm day, May 18, 100 mature staminate flower clusters and an equal number of mature pistillate clusters were examined. The staminate spathes showed a total of 70 living and 73 dead insects. The pistillate spathes showed a total of 60 living and 557 dead insects. This set of observations could be duplicated many times. The following variations should be noted. In mid-afternoon and early evening few living insects are found in either staminate or pistillate spathes. The greatest number of insects have been found about midday of dark and rainy days. Insects found in staminate spathes are well dusted over with pollen, and many of those found in pistillate spathes also carry pollen on body, wings or legs. The data given above would seem to indicate that the insects seek the spathes for hiding or shelter. Those entering staminate spathes may go out again readily, but carry with them a load of pollen. If the second spathe entered surrounds a pistillate spike, the pollen will probably be left on the stigmas as the insect struggles to escape. This, of course, implies a purely accidental transfer of pollen. The fact that more living insects are found in pistillate spathes than in staminate, as well as the finding of occasional visitors feeding on the stigmas indicates a possible attraction of the pistillate cluster.

Instances like the following strengthen such an idea. In a cluster of plants in the greenhouse one pistillate and twelve staminate clusters were mature at the same time. Examination of these at midday showed 25 living insects in the pistillate spathe and no living insects in any of the others. This is an extreme case, to be sure, but it is not unique.

To summarize the case briefly: It is certain that pollen is carried by insects which seek the spathe, probably for shelter or hiding. The slight space around the pistillate spike insures the transfer of pollen from insect to stigma. There is evidence of insects being attracted to the pistillate flower cluster; but outside of the possible use of the stigma for food or a possible odor from the slime filling the ovary cavity, the cause of such attraction is unknown.

EMBRYOGENY

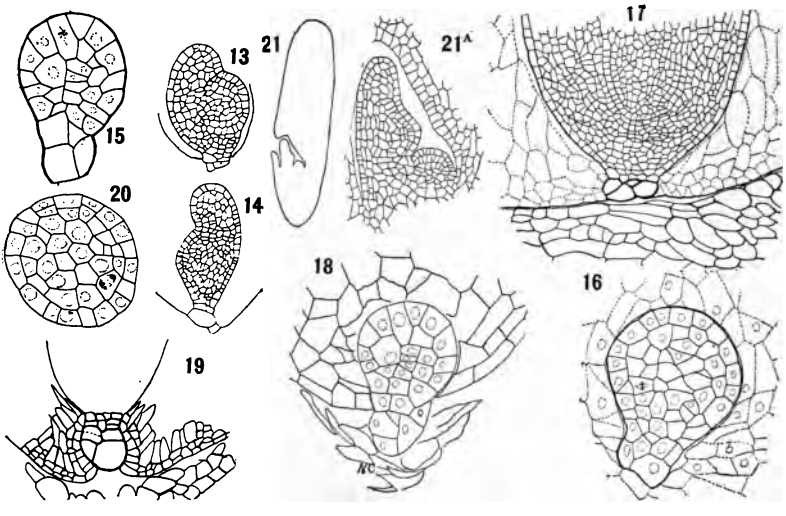
The only published account of the embryogeny of *Arisaema triphyllum* is that by Gow in 1908 (13). The findings of that paper, briefly stated, are as follows: The fertilized egg does not divide until after the endosperm development has begun. The first two divisions are transverse followed by a longitudinal division (13, *f. 20–22*). The figures show a regular chain of two and of three cells, without showing their relation to the basal cell cut off by the true first division.

The following notes are based on the study of more than two hundred preparations covering the phases of development described.

At the time of entrance of the male nucleus, the egg nucleus is well defined and about the size of the synergid nuclei. After fertilization the egg nucleus increases in size so that at the time of segmentation for the first division it has reached about twice its former diameter. This resting stage, if it may be so designated, is about twenty-four hours in length. As reported by Gow (13, p. 42) the fertilized egg does not divide until after the endosperm has well started (PLATE 1, FIG. 9; PLATE 2, FIG. 30). In fact the endosperm mass may be composed of twenty cells before the first division occurs. Ovules fixed 86 hours after pollination show embryos of two to six cells, and endosperm of twenty to forty cells. Those fixed 72 hours after pollination show eggs ready for the first

division and endosperm from the free nucleate stage up to twenty cells.

The first division of the fertilized egg results in the formation of a small embryo cell and a large suspensor cell (PLATE 1, FIGS. 7, 11). The suspensor cell may divide at least once immediately (PLATE 1, FIGS. 12, 13), and later undergoes several divisions (TEXT FIGS. 13–19). The development of the complex suspensor shown



FIGS. 13, 14. Embryos with two growing regions newly differentiated. The section in FIG. 13 is just a little diagonal. × 65.

FIGS. 13–18. Embryos of increasing age, showing arrangement of cells and development of suspensor. 13, 14, 17, × 65; 15, 16, 18, × 165.

FIG. 18. An embryo with the suspensor group pushed into the broken down nucellar cap, *NC*. × 165.

FIG. 19. An unusually complex suspensor group and an embryo deeply buried in the endosperm. × 65. This and FIG. 17 show the thickening of the suspensor cell walls.

FIG. 20. Cross section of an embryo similar to that in FIG. 16. × 165.

FIG. 21. A diagrammatic longitudinal section of an almost mature embryo. × 15.

FIG. 21*a*. Detail drawing of plumule of FIG. 21. × 65.

does not take place until the embryo has assumed a somewhat globular form, as in TEXT FIG. 15, where two or three divisions have occurred and the resultant cells enlarged. As growth of embryo and endosperm proceeds, the suspensor cells form thick walls, and become closely connected with the aleurone layer of the endo-

sperm (TEXT FIGS. 17, 19). The extension of the suspensor mass beyond the endosperm into the remnant of the nucellar cap with its cells full of starch (TEXT FIGS. 15, 18) suggests a possible function as an absorbing agent. Again a peculiar development has been noted as in TEXT FIG. 19, where the crowding of the surrounding endosperm has forced the embryo, at an early stage, farther than usual from the surface. The embryo has retained its connection with the surface layer, however, by means of a more than usually complex suspensor system. PLATE 1, FIG. 8, shows a four-celled embryo and two very short suspensor cells. In the formation of a well-developed suspensor, *Arisaema triphyllum* stands alone among the aroids of which we have full descriptions. *Pistia* with its globular embryo and no suspensor as described by Hegelmeier has been taken as the type of the group. More recently Campbell has described *Lysichiton kamtschatcense* (5) and *Nephthytis liberica* (7) as producing an embryo without suspensors. In speaking of *Anthurium violaceum* Campbell (7, p. 334) says, "the egg . . . is attached by a broad base to the apex of the sac." He also speaks of a rudimentary suspensor formed by the division of the basal segment of the embryo in this species. This seems to be quite similar to *Aglaonema commutatum* as reported by the same author (6), which is said to show the embryo attached to the wall of the embryo-sac by a cell which might be considered a suspensor. Campbell also reports for *Spathicarpa sagittaefolia* the cutting off of a small basal or suspensor cell by the first division of the fertilized egg. In *Arisaema triphyllum*, as already stated, the first division produces two unequal cells, the basal and larger one of which is similar to that cut off by the first division in *Anthurium* and *Aglaonema*. But in *Arisaema* this cell by repeated divisions produces a complex suspensor system.

Returning to the development of the embryo proper, it has been observed that a second and even a third transverse division may take place (PLATE 1, FIG. 10). The greater number of the preparations show the second division in a vertical plane, as in PLATE 1, FIGS. 13, 14. A second vertical division across the plane of the first produces a four-celled embryo. The four-celled embryo is loosely held together and covers the top of the suspensors as a disk-like cap. The later divisions have not been followed in

detail. Growth takes place by a division of all the cells of the embryo, resulting in the formation of a symmetrical, globular body (TEXT FIGS. 15, 16, 18). TEXT FIG. 20 shows a cross section of such an embryo as is shown in longitudinal section in TEXT FIG. 16. At this stage there is no differentiation other than the formation of a distinct epidermal layer. The form soon changes from globular to ovoid and then tends toward cylindrical. During these changes two growing regions develop. The distal portion develops the cylindrical cotyledon while a lateral protuberance shows the initials of the plumule (TEXT FIGS. 13, 14). The cotyledon continues growth both in length and width much more rapidly than the plumule and finally surrounds the latter almost entirely (TEXT FIG. 23 *B*).

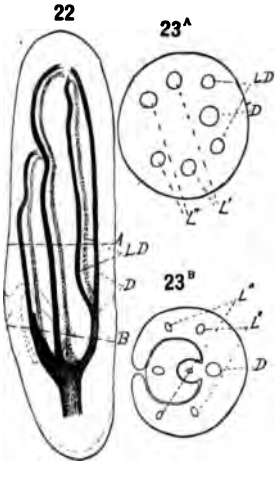


FIG. 22. Reconstructed vascular system for mature embryo. × 20.

FIG. 23*A*. Diagrammatic cross section of FIG. 22 at *A*.

FIG. 23*B*. Diagrammatic cross section of FIG. 22 at *B*. *D*, dorsal strand. *LD*, branches of dorsal strand. *L'*, *L''*, median and forward lateral strands.

The mature embryo is 1–1.5 mm. in length and approximately one fourth as thick. It is cylindrical or ellipsoidal in form, attached to the endosperm periphery by the hardened suspensor cells at the radicle extermity, and lying in a cavity lined by the collapsed endosperm cells from which the food material has been absorbed. It shows clearly marked dermatogen, periblem and plerome areas below the plumule, with a well developed calyptrogen and cap as in a normal root. The plumule shows one leaf enveloping a stem initial group wholly or nearly so (TEXT FIGS. 22, 23*B*). The vascular system of the embryo shows only fundamental elements—largely protophloem, and consists of a cylinder in the radicle with six primary branches just below the plumule (TEXT FIGS. 22, 23*A*). The largest or dorsal strand with two laterals produced at about the level of the plumule tip extends almost to the extreme tip of the cotyledon. There are two lateral pairs of branches, one in the

median lateral region and one in the anterior portion of the sides. All these branches produce short spurs and anastomose rather freely near their distal extremities. The sixth strand, which must be considered the extension of the main axis, passes into the plumule and scale leaf.

The diagram and description given are intended to cover only the more constant features. The differentiation of the parts depends upon the development of the embryo as a whole. In some seeds whose development was cut short by an early drought, but which, none the less, were viable and produced vigorous seedlings, the embryos showed scarcely a trace of vascular strands. In others with long growth period, the primary xylem elements were evident before germination.

THE ENDOSPERM

At the time of the entrance of the pollen tube the embryo-sac contains a normal egg apparatus, three inactive, shrunken antipodals and an endosperm nucleus. This endosperm nucleus, found usually near the chalazal end but sometimes near the middle or even in the micropylar end of the sac, is the most conspicuous nucleus in the cavity. A little before the fusion of the sperm and egg nuclei, the endosperm nucleus divides. Whether or not there is a fusion of one male nucleus with the endosperm nucleus can not be stated positively. Gow (13) states that a second male nucleus enters the embryo-sac and approaches the endosperm nucleus; but he did not observe any fusion or even contact of the two. The writer has not seen any direct proof of such a fusion; but its occurrence is suggested by the fact that division of the endosperm nucleus has been found only at a time shortly after the entrance of the pollen tube into the embryo-sac. This relation is further indicated by the failure of the endosperm nucleus to divide in embryo-sacs untouched by pollen tubes, a fact abundantly proved by the careful examination of numerous sterile ovules beside those developing into normal seeds as well as those from spikes protected from possible pollination. The finding of but six examples of the division of the endosperm nuclei in one bunch of 150 ovules showing stages from mere entrance of the pollen tube up to the formation of the first walls between the free

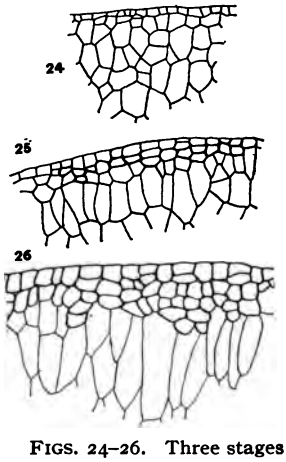
endosperm nuclei, indicates that the division of the primary nucleus and the migration of the daughter nuclei take place very quickly.

At the time of the division of the primary endosperm nucleus, the protoplasm in the embryo-sac becomes highly vacuolated or frothy, many small vacuoles taking the place of the few large ones usually found (PLATE I, FIG. 6). Some preparations seem to show a delicate cross wall formed after the first division of the endosperm nucleus. Most of the preparations seem to indicate that nothing more than a slight condensation of the protoplasm occurs. It seems certain that one daughter of the endosperm nucleus moves toward the egg and by two or three consecutive divisions produces four to eight free nuclei in the upper portion of the embryo-sac, PLATE I, FIG. 6. Contrary to the report of Gow (13, p. 42) these nuclei do not retire to the periphery of the cavity but remain scattered promiscuously through its upper portion. There is a slight tendency for all to move toward the micropylar end of the sac, so that the mass of large irregular endosperm cells, produced by the formation of walls in all directions about the nuclei, is crowded into that portion of the cavity (PLATE I, FIGS. 7, 9, 12). Congregation in the upper end is further produced by the rapid increase of liquid contents in the lower or residual cavity. The embryo-sac enlarges rapidly at the time of fertilization and the remnant of the lateral nucellar tissue is quickly disorganized. As a result, not infrequently the nuclei of this tissue are seen in contact with the thin walls of the new endosperm cells or even buried in the protoplasm of the cavity before walls are formed, so as to seem to belong to the endosperm. At this early stage, however, the active endosperm nuclei are quite large and well organized, frequently showing two or more nucleoli. In older cells the nuclei are smaller and resemble those of the nucellar tissue closely enough to be confused with them.

The formation of the endosperm as just described leaves the egg cell (and the synergids if not destroyed) closely invested by the upper end of a large endosperm cell (PLATE I, FIG. 9) or by two or three such cells (PLATE I, FIGS. 7, 11, 14). For a time further growth of the endosperm is accomplished by the division of the cells bordering the first wall formed across the embryo-sac cavity.

Here a well-defined plate is soon formed (PLATE 1, FIG. 7; PLATE 2, FIG. 30). These lower cells continue to divide and grow, pushing the mass into the lower cavity. The pressure of the liquid contents of this cavity opposes the encroaching mass and causes its dome-like form. Growth of the whole mass of endosperm continues, more rapidly near the lower margins, less rapidly in the central portion, until the residual cavity is surrounded except at the chalazal end where the base of the nucellus and the adjoining integumentary tissue has been broken down. Soon after a definite plate of endosperm has been formed next to the residual cavity, there is developed a region of specially active tissue two or three cells above the lower surface of this plate (PLATE 2, FIG. 25). By the active multiplication and growth of the cells in this region the plate is forced downward into the residual cavity, and the mass of endosperm is increased. By the same action the cells of the endosperm bordering the residual cavity are subjected to lateral pressure between the restraining walls of the integuments until they become long, narrow and palisade like. During this time the large cells first formed have divided until they have surrounded the embryo with small, compact cells in every way similar to those composing the mass of the endosperm.

When the endosperm mass is about one third formed there appears a peripheral layer of cells unlike those of the body of endosperm. By periclinal division of these an irregular layer of short flat cells is formed, varying abruptly from one to five cells in thickness. TEXT FIGS. 24–26 show consecutive steps in the development of this layer. These cells are ultimately filled with protein food stuff, probably aleurone. In the mature seed the endosperm cells, except the aleurone layer, are filled with starch in the form of small simple and compound grains. The process begins in the peripheral cells of the upper portion and extends downward



FIGS. 24–26. Three stages in the development of the peripheral proteid-bearing layer of the endosperm. FIG. 26 was drawn from a section of almost mature endosperm. All, × 52.

and towards the center. A cylindrical portion immediately below the embryo is the last to befilled. The cells about the embryo lose their starch to the growing embryo and remain as a mass of crushed cell walls.

The characteristic feature of *Arisaema* among the aroids is the segregation and the sterility of one daughter of the primary endosperm nucleus and the migration of the active endosperm nuclei to the micropylar portion of the embryo-sac cavity. The formation of a few free nuclei followed by the formation of walls simultaneously between these occurs in *Lysichiton kamtschatcense* (4), but in that case the walls extend entirely across the cavity instead of breaking it up into irregular cells; and the whole cavity is divided up by these cross walls instead of a rather small micropylar portion as in *Arisaema*. The formation and persistence for a time of large endosperm cells in the micropylar extremity of the cavity has been noted in *Lysichiton* (4) and in *Aglaonema commutatum* (6). Along with the other forms, there is in *Arisaema* no migration of the free endosperm nuclei to the peripheral layer of protoplasm.

THE RESIDUAL CAVITY

As noted elsewhere the formation of endosperm in the upper portion of the embryo-sac leaves in the basal portion a large cavity, which may be designated as the residual cell or cavity (PLATE 2, FIG. 31). This cavity contains a lining layer of protoplasm, abundant cell sap and a daughter of the primary endosperm nucleus. The nucleus is the most conspicuous feature of the cavity, having the appearance of a large resting vegetative nucleus with a well defined nuclear membrane and a conspicuous nucleolus within the vacuolate nuclear sap (PLATE 2, FIG. 32). Before definite marks of decomposition appear, this nucleus may reach a diameter of 100–110 microns, and its nucleolus a diameter of 20–25 microns. Later the nucleolus divides or fragments first into a few and then into many small portions. Soon the nuclear cavity shows a more marked network of fine threads and by the time the endosperm has reached half its mature mass, the outline of the greatly enlarged nucleus becomes irregular, the nucleolar fragments disappear and only a mass of fine fibrils remain in the cavity. The enlargement and disintegration continue as the seed matures until the nucleus

may fill a fourth or more of the residual cavity before finally becoming indistinguishable from the remnants of protoplasm around it.

Immediately after the organization of this vegetative nucleus, numerous leucoplasts appear in the residual cavity. They are found chiefly clustered closely around the large nucleus, which they sometimes completely envelop with their own mass and that of the starch they form. The basal nucellar tissue is being rapidly broken down at this time, and the starch stored in the inner integument is being withdrawn. It seems to be the business of this vegetative nucleus and the accompanying leucoplasts to elaborate the food secured from surrounding tissues for absorption by the growing endosperm, or in the case of over supply, to reorganize it into stable starch form. Even after the disorganization of the nucleus the leucoplasts seem active. They are the last organized bodies to disappear from the residual cavity, and may be observed singly or in globular masses of the size of a normal endosperm nucleus after the large nucleus of the cavity has completely broken down.

A point of special interest to the writer is the fact that in ovules having no fecundated egg, the primary endosperm nucleus behaves much as the nucleus just described. The leucoplasts congregate about it and often almost fill the embryo-sac with masses of starch grains before the general decline of the tissues begins.

The activity of the vegetative nucleus is accompanied by a marked increase in the size of the residual cavity. It not only occupies the place of the disintegrated antipodal cells and basal nucellar tissue, but it crushes the inner integument from which the food material has been removed. Finally by the pressure of its increasing liquid contents it forces the endosperm toward the micropyle, and spreads the base of the ovule, giving it the characteristic form of the seed (PLATE 2, FIG. 31).

THE SEED COATS

In order to understand fully the steps in the development of the seed coats, a statement of some nutritive processes preceding fertilization is necessary. During the tetrad divisions and the maturing of the megaspores, the cells of the nucellus become filled with starch. During the growth of the embryo-sac all this starch

is withdrawn from the lateral portions and much from the basal portion of the nucellus. From the maturity of the embryo-sac to the time of fertilization starch is rapidly stored in the integuments, except in their upper portions. Both the integuments become considerably thickened, and the inner one shows a peculiar elongation of the cells bordering the basal portion of the embryo-sac and nucellus (PLATE 2, FIG. 28). A like increase in size of the cells of the basal nucellar tissue is also noticeable at this time (PLATE 2, FIG. 27). These cells, as well as those of the integuments, become well filled with starch, especially if fertilization does not take place until late. The changes so far noted are not in any way the result of stimuli connected with pollination or fertilization, as is shown by the fact that they occur to a noticeable extent in ovules of flowers protected from possible pollination, and in ovules which have failed to develop any embryo-sac, as is the case shown in PLATE 2, FIG. 27.

After fertilization has taken place the thickening of the integuments and the accompanying gathering of the starch continue for some time. As is described in connection with the history of the endosperm, very shortly after the organization of the vegetative nucleus in the residual cavity, the basal nucellar mass is destroyed. The subsequent increase in the size of the whole embryo-sac cavity is due to pressure of rapidly increasing cell sap. At the same time the food from the integuments is transferred to the residual cavity and thence to the endosperm and embryo. As a result of this expansion and food transfer the inner integument is reduced to a sheath of dead empty cells, crushed against the outer integument. The food is withdrawn from the second integument by way of the chalaza, and the inner cells crushed. Before this is accomplished the four outer layers of cells form thick cutinized walls (TEXT FIG. 27), and so produce a firm outer covering of the seed. Many of the cells of the outer integument become filled with a tannin compound, which Rennert (**22**) has noted as a preservative measure at the time of germination. The cell walls of the integuments persist so that the mature seed is sur-

FIG. 27. Epidermis and underlying cells with thick walls forming the outer part of the testa. × 52.

rounded by two distinct coats. The necks of the integuments shrink and remain as a beak over the micropyle of the seed. With the drying of the funiculus and contiguous structures the basal walls cover the remains of the residual cavity whose presence is indicated by a more or less marked depression at the base of the mature seed.

THE FRUIT

The wall of the ovary is composed of a definite epidermal layer with thickened and somewhat cuticularized walls, and an inner or lining layer of thin-walled cells. Between these layers in young ovaries is a loose mass of spongy tissue composed of nearly isodiametric cells. These spongy tissue cells elongate along some one axis in various directions and so produce large intercellular spaces. This formation is less evident next to the epidermis where one to three layers of cells retain their earlier form and position. In the upper part of the ovary the air spaces are largest, which, together with the formation of many large raphide cells, makes this portion of the wall much thicker than elsewhere (PLATE 2, FIGS. 26, 33; TEXT FIG. 51). As the seeds mature the growth of the ovary wall continues so that a considerable space is formed for the growth of the seed (PLATE 1, FIGS. 17, 20). At this time the chloroplasts break down and irregular, more or less globular masses of yellow bodies appear in the formerly chlorophyll-bearing cells, giving the fruit its characteristic color.

The mature fruit is a scarlet or vermillion berry 3–6 mm. in diameter, with flattened sides and containing one to six white seeds (PLATE 1, FIGS. 15, 16, 18). As the fruits mature, the axis of the spike elongates and enlarges by increase of its air spaces so that the fruits are not more closely crowded than the ovaries at anthesis (PLATE 1, FIGS. 20, 21). The clusters of scarlet or vermillion berries are among the most conspicuous of late summer fruits and are carried by birds, mice, and chipmunks. The use of the fruit pulp as food by animals is made more possible by the development of a slightly sweet taste and the disappearance of most of the raphides from the thoroughly ripened pulp.

DEVELOPMENT AND LIFE OF THE CORM

In a brief paper before the regular winter meeting of the Indiana Academy of Science in 1912 (19) the writer suggested that the life of the corms of *A. triphyllum* was fairly definitely fixed, no part of the corm probably being more than four years old. Wider observations of mature corms along with a study of the development of corms in seedlings makes it possible to add materially to the report cited.

MacDougal (17) and Rennert (22) have given quite full accounts of the germination of seeds of *A. triphyllum* and *A. Dracontium* and the development of the seedlings. The author has verified the findings set forth in the two papers mentioned, with some minor exceptions to be noted below. The findings of MacDougal and Rennert for *A. triphyllum* may be briefly summarized as follows: In the presence of moisture and suitable temperature the seeds swell, and the outer rows of testa cells are dissolved. The starchy endosperm, protected from external agents by the tannin impregnated cellulose layer of the testa, is dissolved by diastase formed by the epithelium of the imbedded embryo. Within the embryo the cotyledon elongates by a lengthening of its cells and pushes the hypocotyl and plumule bud from the seed. By a curvature of the cotyledon just outside the seed its point is directed downward. The hypocotyl enlarges as a result of the increase in size and number of its cells. By active division of the procambium cells both in their longitudinal and transverse diameters much new tissue is rapidly formed. The fibro-vascular system, raphide cells and storage cells are soon differentiated, while a layer of periderm (TEXT FIG. 28) consisting of five or six layers of empty flattened cells arises on the outside of the enlarged portion and finally separates the newly formed corm from the cotyledon. While these changes have been

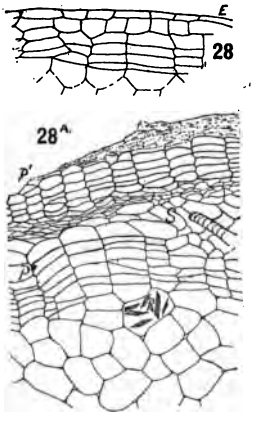
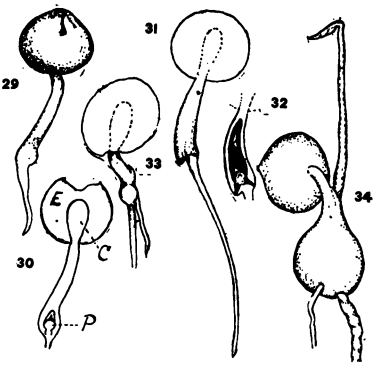


FIG. 28. The phelloderm layer forming beneath the epidermis, *E*, of a first year corm. × 60.

FIG. 28*a*. An old layer of phelloderm, *P'*, and a new layer, *P''*, forming within and cutting off the exhausted starch cells, *S*. *R*, a raphide cell. × 60.

taking place, growth and development of the parts of the plumule has taken place. The first leaf with its blade closely convolute and bent forward is pushed up by the rapidly elongating petiole (PLATE 3, FIG. 34). Without going into greater detail, it has been found that first a primary root arises at the tip of the hypocotyl before any considerable enlargement has taken place, and later one to three other roots appear at various points on the lower half of the young corm. The structure and activities of these roots will be considered in a separate section. TEXT FIGS. 29–34 give the gross structure and the changes during germination. FIGS. 34–39 (PLATE 3) show the development of the seedling leaf.



FIGS. 29–34. Germination of seed. × 2.

FIG. 30. A longitudinal section of seedling in FIG. 29, showing one end of the cotyledon, *C*, in the endosperm, *E*, and the other carrying the plumule, *P*, into the soil.

FIG. 31. A later stage,—section of part of seedling in FIG. 31, showing advanced plumule and the origin of the secondary roots.

The papers cited leave the impression that a primary difference between the germination of *A. triphyllum* and *A. Dracontium* is in the fact that most seeds of the latter germinate blindly, i. e., without producing functional plumules the first season, while the seeds of the former universally produce functional plumules the first season. During three years the author has grown many *A. triphyllum* seedlings and has always found a considerable number of blind germinations. The following data from one season's cultures will explain. Seeds were freed from the fruit pulp and planted in good moist loam in 20 cm. flower pots and given as nearly ideal conditions as possible. Careful record was made of all leaves appearing above ground during the growing season, and after all leaves were dead the corms were removed and counted.

Seeds planted	900
Leaves above ground	643
Corms removed	767

Difference, indicating number of blind germinations, 124, or 16 per cent.

This result has been repeated with slight variations during the three seasons. Cultures kept in the greenhouse from the time of planting, those allowed to freeze sharply two or three times and then brought into the greenhouse, and others allowed to remain outside during the entire winter all showed about the same ratio of percentage of seeds producing functional plumules and of those germinating blindly. These findings have been further strengthened by the discovery, in cultures of *A. triphyllum*, of corms without plumules, very similar to those of *A. Dracontium* during the growing season.

Briefly stated, *A. triphyllum* seeds produce during the first season underground stems or corms in which is stored the transformed food from the endosperm in the case of those germinating "blind," and in addition to this food, that which is produced by photosynthesis in the first leaf in the case of those producing functional plumules. At the end of the first growing season the corms, surrounded by a layer of periderm, surmounted by a single terminal bud, and entirely free from roots and seed remnants, have much the appearance of well nourished mature plants except in size. The largest corms found were in cultures with a total growth period of fifteen weeks. They were 15 mm. long and 12 mm. thick. The range of size in the corms of these cultures was from 5–12 mm. in thickness and 6–15 mm. in length, with the exception of a few which were about the size of seeds. The number of these small corms was so nearly that of blind germinations in each culture that a relation between the two is certainly suggested. FIGS. 61, 62 (PLATE 4) are from photographs of two such groups of corms. FIG. 61 probably represents the blind or incomplete germinations and FIG. 62 a part of the complete germinations from seeds of one planting.

Some data concerning conditions for germination, not given by previous investigators, may well be given here. Seeds freed from the pulp were planted 2 cm. deep in rich loam in flower pots on November 16. These cultures were divided into three groups, *A*, *B*, *C*, and subjected to different conditions as follows:

A. These cultures were left in the greenhouse at an average temperature of 70° F. from the time of planting. The first leaves appeared above the soil January 15. The last leaves to appear

were noted March 26. Thus the total period of germination covered nearly ten weeks. The total number of germinations was 86.6 per cent. of the number of seeds planted, and 20 per cent. of germinations were blind.

B. These cultures were put outside until March 13 with the pots buried level with the surface of the soil. They were removed on March 13 to the greenhouse with an average temperature of 70° F. The first leaves appeared April 3, and the last ones April 23, showing a germination period of twenty days. The number of germinations was 87 per cent. of that of the seeds planted, and of the germinations 19 per cent. were blind.

C. These cultures were left in the greenhouse lobby at an average temperature of 50° F. until March 12, when they were placed in the greenhouse beside cultures *A* and *B*. The first leaves had appeared March 6, and the last ones appeared April 23, thus giving a germination period of seven weeks, and a total germination of 82 per cent., 8.1 per cent. of which were blind.

At this time it is desired to call attention to but three evident facts indicated by these germination tests, namely: that there is a considerable variation in the length of the quiescent period required by different seeds of this plant; that this period may be lengthened and the total germination period of a group shortened by repressing early germinating seeds through low temperature; and that the exposure of seeds to frost or freezing does not materially increase the total germination percentage or the percentage of blind germinations.

Cultures have been made by using corms one, two, and three years old and subjected to conditions similar to those described for cultures from seeds. In general, the temperature differences produced no effect other than to lengthen the dormant period when at or below 50° F. Corms have not been induced to begin growth before the first week in March, and but few before the last of March, with some notable exceptions now to be given.

A group of one year corms was planted in the usual way on June 24, kept moist and left in a room with a temperature range from 55° to 80°. On July 11 a part of these corms had pushed normal trifoliate leaves above the soil. These grew until the middle of September. The corms were removed on October 31,

while they could yet be identified by the dead leaves, and replanted in another pot and left with other cultures in the greenhouse lobby until the following April 3, when all were removed to the main room of the greenhouse. At this time a leaf had appeared. By June 3 all these corms had produced leaves equal in size and vigor to the usual third year plants. These plants will, of course, be closely watched to determine whether they will remain true to their double annual growth.

After the leaves had died down at the end of the first season of growth, the corms were collected, grouped according to size and replanted in pots of rich loam. During the second season of growth the familiar trifoliate leaves were produced. Examination at intervals of a few days showed the following changes in the corms. With signs of growth about the bud,—lengthening of the investing scales and the appearance of roots about their bases,—the lower portion of the starchy tissue began to soften. In five to ten days the starch had been dissolved by an enzyme, and two weeks later only a dry hull of investing periderm remained, the dissolved food material having been entirely absorbed. About one fourth of the fleshy part of the corm was used up in the growth period. See FIG. 48 (PLATE 3) for the portion absorbed by an older corm. Microscopical examination at the beginning of this change showed a layer of phellogenous cells (TEXT FIG. 28 *a*) formed through the food reservoir and cutting off the portion in which digestion was taking place. This new tissue covered the remainder with a close coat up to the base of the bud, leaving only passage for the absorbing vascular strands. At the end of the growing season the corms showed a new, large and well-developed terminal bud covered with the dry shreds of the dead leaf base. The basal part was covered with the wrinkled first periderm. Just at the basal margin of the bud scales were one to three lateral buds. A few of the smallest corms lacked these buds entirely. Just on a level with the ring of lateral buds was a ring of readily noticeable scars where the roots had been attached (PLATE 3, FIG. 49). In size the corms measured 6–15 mm. in length and 3–10 mm. in thickness. This growth had occurred in two directions, longitudinally and radially about the long axis, and had been accomplished by the production of new storage tissue just beneath the terminal bud.

Growth during the third and fourth seasons is not marked by any peculiarity. The corms increase in size because of additional storage of starch, and new lateral buds are produced each season (PLATE 3, FIG. 49). At the end of the fourth season of growth the largest corms show spikes of staminate flowers. Such corms measure 15 mm. or more in thickness. Of the plants grown from seed by the writer only about 10 per cent. produced flowers the fourth year, the remainder failing to produce flowers before the fifth or sixth year.

After the first appearance of the flowers the growth and activity of the corm is quite regular, there being new lateral buds formed (PLATE 3, FIG. 49) as before and new food material stored up each growing season. The increase in size is not uniform from year to year, for, while constantly increasing amounts of food are removed from the corm each year for use in producing leaves and flowers, the amount of new storage is always dependent upon the length of the season of growth. So after several consecutive short growing seasons some old corms may be greatly reduced in size as a result of the drain to produce early growth and the failure to replace the food so used. The mass of starch is not divided into sections as it is stored up, but the dividing layer of phelloderm is formed each year, cutting off the portion to be used at that time. In the case of several consecutive poor growing seasons the available amount of food becomes so reduced that growth of leaves and flowers is curtailed, and the production of flowers may even be entirely suspended. In the majority of cases examined in the field, the appearance of buds and root scars seems to indicate that the oldest portion of the corm is four years old or thereabout.

Another point worthy of note is that a small number of the corms, 3–5 per cent., lie dormant during whole growing seasons. This is true with corms of all ages from one year up. As yet no reason for this phenomenon has been suggested. Neither is there apparent any regularity to indicate a cyclic occurrence of resting periods. It has been noted, however, that in a very few cases the resting period covers only a part of the season, and, consequently, the plants appear in late summer. This is probably related to the phenomenon of double seasonal growth mentioned above.

The formation of lateral buds has already been mentioned.

These vary both as to number and size. Usually not more than three buds are formed in a season. The size varies with the size of the primary corm, and with the length of the growing season. As stated above, the buds appear first with the growth of the second season. They may then be as much as 2 mm. thick or may be indicated merely by a slight hump over the bud initials. Mature corms may produce buds varying from initial cell groups up to bodies as large as third year seedling corms, i. e., up to 15 mm. in thickness. The greater part of the growth is made the first season. In some cases growth is noticeable after the first season. The buds may be broken from the primary corm and begin independent growth at any time after their formation; and they are regularly pushed off with the dead periderm about the fourth year. Very rarely they produce roots and begin independent growth while attached to the old corm (PLATE 5, FIG. 69). But in no case has the writer seen a bud shrivelled as would be the case if any of the starch should be at any time withdrawn into the parent corm. After being detached the buds develop in every way as seedling corms, and require one to several years of growth before producing flowers. Gow (14, p. 135) states that buds may produce flowers the season following detachment; but the writer has failed to verify the finding.

It will be seen at once that, since they may be readily broken off by trampling of animals or by soil movements resulting from freezing or floods, these buds are important means of vegetative propagation. In fact, the increase in number of plants where large corms have been dug up, the spreading colonies of small plants in wooded pastures, and finally, the very few seedlings found in this section, all indicate that the buds are the chief means of multiplication.

One of the most noticeable features of the corms as collected in the field, is their lack of symmetry and their oblique position (PLATE 3, FIGS. 50, 51). It is quite rare to find mature corms more nearly symmetrical than the one in PLATE 5, FIG. 69. In many cases this is certainly due to displacement by the trampling by animals; but in the writer's opinion, it is more often due to the formation of an unequal number of roots on different sides of the bud. This unequal distribution causes an upsetting of the corm

late in the season when the roots shorten and produce the so-called root pull. This opinion has been strengthened by the fact that pot cultures in which the corms were carefully placed in an upright position, always show many of the corms tilted and some almost inverted after one growing season.

THE ROOT SYSTEM

The roots of *A. triphyllum* seedlings have been briefly described by Rennert (**22**, pp. 46, 47), as being of two forms, a group of two or three short, slender primary roots and a group of three secondary roots. The latter appear after the primary, have an origin higher on the corm, are larger and longer than the primary, and are contractile. Both primary and secondary roots are diarch in structure. To this the writer would add that in all seedlings examined he has found but one primary root, and it is diarch in structure. The later roots are either triarch or tetrarch.

In mature plants Rimbach (**24**) has reported two groups of roots in *A. Dracontium*, and then adds, "*Arisaema triphyllum* (L.) Torr. resembles perfectly *A. Dracontium* in the behavior of the underground organs" (**24**, p. 175). According to this author there appears at the beginning of the growing season a circle of long slender simple roots which extend in a more or less horizontal direction. Later a second group appears slightly above the earlier roots. These are robust, long, simple roots which grow nearly directly downward. They show a marked contraction shortly after their formation. All roots are deciduous, being separated from the corms about the time of ripening of the fruit. The present writer has found a varying thickness of 1–2.5 mm. in the roots of mature corms of *A. triphyllum*, and perhaps two groups in time of origin, although the demarcation between the two is not as

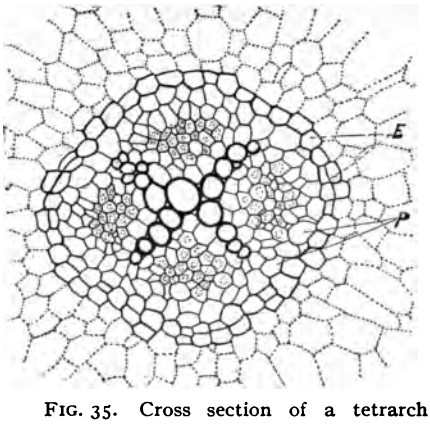


FIG. 35. Cross section of a tetrarch stele, showing clearly marked but irregular endodermis, *E*, and pericycle, *P*. × 160.

distinct as reported by Rimbach for *A. Dracontium*. The mature roots show many branches near their tips (PLATE 5, FIG. 69). In section these roots show a three- to five-radiate stele with a distinct endodermis of one to two rows of thickwalled cells (PLATE 5, FIG. 66; TEXT FIG. 35). Around this is a thick cortex of parenchymatous cells, small next to the endodermis but much larger and torn or distorted near the dark and more or less corky epidermis.

As to the contractile feature of the roots of mature corms, the statement of Rimbach (24, p. 172) that the contraction may amount to 40 per cent. in the basal portion and a total of 15 mm. or more for the whole root in *A. Dracontium* seems to hold equally well for *A. triphyllum*. The work of De Vries (8) and Rimbach (23) has left nothing to be added to this subject from a study of *Arisaema*. A point of interest appeared in the cutting of longitudinal sections of mature roots. The material had been killed in hot acetic alcohol and embedded in paraffin in the usual way. The transverse cortical ridges or wrinkles were quite prominent, but the stele seemed to be in normal position. As soon as the sections were cut, however, they became very much twisted and crumpled. Examination with the microscope showed the usual distortion of the outer cortical cells, an inner region of undisturbed cells, and then the stele section all twisted and folded (PLATE 5, FIG. 68), as though it had been held in position by the rigidity of the surrounding zone of cortical tissue.

The minute structure of a growing root tip of *A. triphyllum* shows a feature which seems unique. At the root tip (PLATE 5, FIG. 67) the usual angiosperm type is evident in the formation of a dermatogen, periblem, plerome, and root cap more sharply marked than in the onion. But at a point about the width of the root from the tip, there appear in the third and fourth layer of cells inside the dermatogen, large, elongating cells in every way similar to those forming the primary xylem elements in the plerome (PLATE 5, FIGS. 63, 64, 65, 67). These cells increase in length and finally unite to form continuous tubes in the outer cortex of the root. Their walls remain unchanged and the cavities are at a very early period filled with bundles of raphides.

LEAF STRUCTURE AND DEVELOPMENT

The seedling leaves of *A. triphyllum* are simple, cordate to ovate abruptly acute, with a slightly cordate base. The blades are from 5 mm. wide by 10 mm. long to 20 mm. wide by 30 mm. long. The venation is reticulate, pinnate, with two prominent basal branches "foreshadowing distinctly the plan of the mature trifoliolate leaf" (22, p. 48). The margin is very finely toothed. It is slightly membranaceous and crisped. The upper surface is glabrous, shining at first but becoming dull with age. The lower surface is distinctly glaucous after the leaf is fully expanded. The petiole may vary from 4–20 cm. in length. Its enlarged, hollow base covers almost entirely the new terminal bud of the corm. PLATE 4, FIG. 58, shows a small group of average seedlings.

The primordium of the first leaf is laid down some time before the seed is matured, and in the mature embryo the regions of petiole, midvein and lamina are clearly marked (TEXT FIGS. 21, 22). During germination the blade develops rapidly, and, closely rolled, is pulled from the soil by the lengthening of the petiole, which usually arches in its escape from the cotyledon. PLATE 3, FIGS. 34–39 show the normal seedling leaf blade from its first appearance to its final expansion. Occasional lobed leaves suggestive of the later compound leaves are found. Such a form with two lateral lobes symmetrically placed is shown in PLATE 3, FIG. 43.

FIG. 36. A second year leaf, showing form and venation. × 1.

The leaf of the second year is typically trifoliolate (TEXT FIG. 36) and in all but size is like that of the mature plant. The leaflets are ovate to cordate, sessile, with acute apex and cordate to slightly tapering base. The lateral leaflets are slightly larger and less symmetrical than the terminal. They are pinnately net-veined with surface and margin as in both younger and older leaves. The leaves range in size from 3.5 cm. wide by 2 cm. long to 8

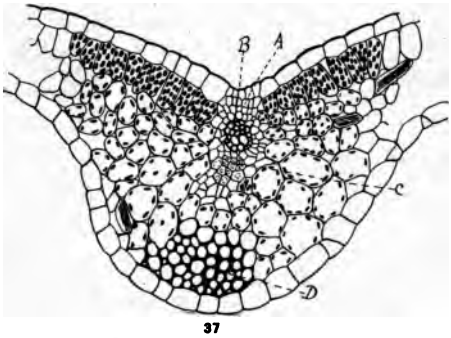
cm. wide by 5 cm. long, with petioles 4–12 cm. long. These leaves come through the ground with all leaflets closely rolled, the laterals appressed to the petiole, the terminal erect and the whole inclosed in a long sheathing kataphyll (PLATE 3, FIGS. 46, 52). PLATE 3, FIGS. 40–42, show the position of the leaflets of the second year leaf. As shown by the cross section diagram in PLATE 3, FIGS. 53, 54, the leaflets are incompletely convolute. In the placing of the leaflets and their escape from the bud the seedling in its second year shows all the characteristics of the mature plant. TEXT FIG. 1 and PLATE 3, FIGS. 44–46, 52, show the leaves of mature plants and such changes as follow the appearance of a second leaf or a flower cluster. After the appearance of the first trifoliate leaf the only change to be noticed in the next four or five years is increase in size. Leaves of mature plants may reach an extreme width of 35 cm., with middle leaflet 25 cm. long and with petioles up to 45 cm. in length.

As is well known, plants showing the same general maturity and even the same size and development of leaves differ in that some will produce but one leaf and others two. Seedlings produce but one leaf each season up to the time of the first inflorescence. After that time all gradations in development have been observed from plants without any suggestion of a second leaf, through those with rudimentary leaves inclosed in the petiole of the first leaf, to plants with two normal leaves almost equal in size. There seems to be no time limit for the appearance of the second leaves after the first inflorescence, and no uniformity in their size when first produced.

As has been stated, the leaves of *A. triphyllum* are net-veined. The system of each leaflet consists of a mid-vein with five to ten strong lateral veinlets with an equal number of weaker laterals between them, and all joining their extremities with a continuous vein extending around the leaf at a distance of 3–8 mm. from the margin (TEXT FIG. 36).

In minute structure, leaves from plants of different age show no noteworthy differences. As seen in section (TEXT FIG. 37) the leaf has a typical mesophyte structure. A single layer of epidermis, with the outer walls slightly cutinized, covers each surface. Next to the upper epidermis is a single layer of short

palisade cells. The remainder of the space is filled with a mass of rather loose, spongy parenchyma, in which the smaller veins are imbedded. The veins are composed of a few spiral ducts and tracheids (TEXT FIG. 37, *B*) near the upper epidermis, from which they are separated by three or four layers of long, thin-walled non chlorophyll-bearing cells (TEXT FIG. 37, *A*) and a small irregular group of phloem elements below (TEXT FIG. 37, *C*). The stiffening factor is a prominent strand of collenchyma (TEXT FIG. 37, *D*) making up the greater part of the ridge on the under side of the leaf.



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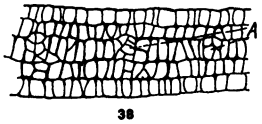

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FIG. 37. Cross section of a mature leaf through a large vein, showing simple epidermis and palisade, the non chlorophyll-bearing cells, *A*, above the xylem elements, *B*, the irregular phloem area, *C*, and the strong collenchyma strand, *D*. × 52.

FIG. 38. A cross section of a young leaf with the first signs of differentiation of cells indicating the position of vascular strands, *A*. × 52.

In surface view the lower epidermis shows irregular cells more or less interlocked by means of undulating walls (TEXT FIG. 39). The stomata average 50 to the sq. mm. and show an average extreme width of 28 microns and an average extreme length of 40 microns. Adjoining the guard cells is a pair of accessory cells (TEXT FIG. 39, *A*). These accessory cells are sisters of their contiguous guard cells and are formed by a second division of the initial cell. Occasional twin stomata (TEXT FIG. 41) have been observed, which have probably resulted from a division of the cells which usually form guard cells. The upper epidermis is composed of cells with much more regular outline, and usually shows no stomata (TEXT FIG. 40).

As the blade appears in the differentiation of the primordium it is composed of five layers of similar cells (TEXT FIG. 38). The

differentiation of certain cells (TEXT FIG. 38, *A*) of the middle layer to form the primary vascular elements occurs first. The epidermis is clearly marked next, followed by the formation of the palisade cells by the top of the three inner layers and the formation of the spongy parenchyma by the lowest layer and the remainder of the middle layer. There is practically no variation in leaf structure coincident with changes in conditions of growth. The petioles of plants grown in the shade are slightly longer than of those grown in full light, and the size of the blades may vary from year to year; but the change in thickness due to increased palisade formation found in leaves of many plants following change from weak to strong light, is not at all evident. A slight increase in the number of stomata, and the occasional appearance of a few stomata on the top of leaves of shade plants has been noted. So far, however, experiments have failed to show whether these changes are the result of different conditions or merely indicate individual variation.

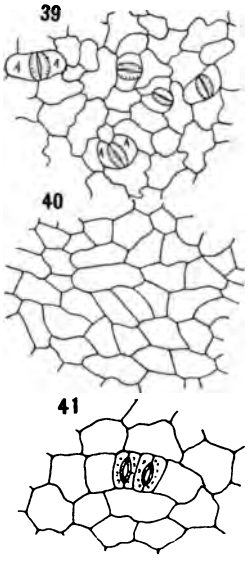


Fig. 39. Surface view of lower epidermis. *AA*, accessory cells.

FIG. 40. Surface view of upper epidermis.

FIG. 41. Twin stomata from lower epidermis.

STRUCTURE OF PETIOLE AND SCAPE

The vascular system of embryo, root and leaf are treated in these sections. The similarity of structure of petiole and scape make possible a common description. These bodies are composed of a peripheral layer of epidermis with slightly thickened walls, and two or three underlying layers of small parenchymatous cells. Inside this peripheral portion is a circle of well developed vascular bundles, each with a strong strand of collenchyma separated by one layer of cells from the epidermis (TEXT FIGS. 43, 44). The vascular elements of these bundles consist of a few spiral ducts and phloem elements, and are duplicates of the principal veins of the leaves. The inner portion of both petiole and scape is

composed of air spaces divided by chains and plates of parenchymatous cells, with vascular bundles scattered promiscuously through the spongy mass (TEXT FIGS. 42–47). The vascular

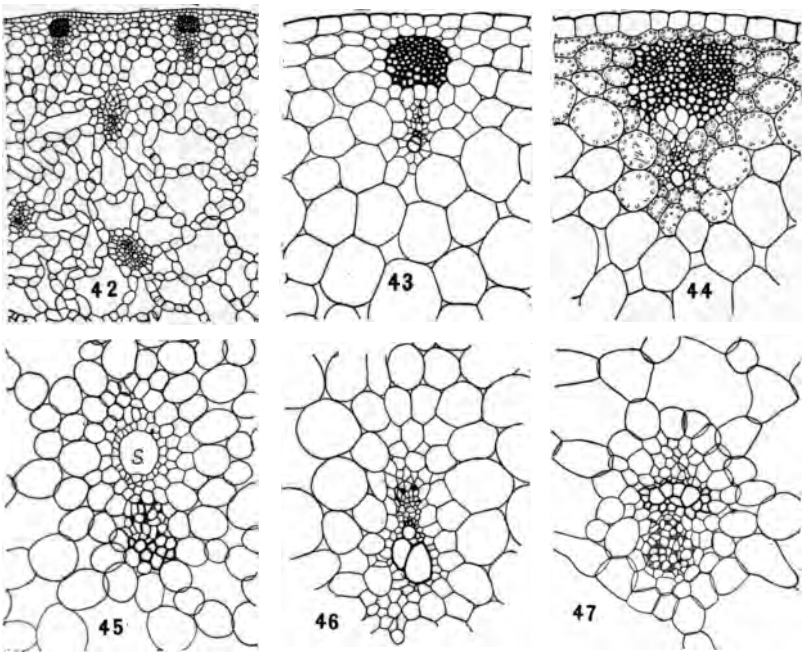


FIG. 42. Part of a cross section of a scape, showing peripheral region with bundles having strands of collenchyma, and the large air spaces of the pith. × 20.

FIG. 43. An average peripheral bundle from a petiole. × 65.

FIG. 44. An average peripheral bundle from a scape, showing chlorophyll-bearing cells. × 65.

FIG. 45. A bundle from the pith of a petiole. *S*, schizogynous vessel. × 65.

FIG. 46. Average bundle from petiole pith. × 65.

FIG. 47. A large bundle from scape pith, showing large phloem area. × 65.

bundles of the pith region are, as a rule, similar to those of the periphery, but lack the strand of collenchyma. There is considerable difference in the size of the bundles, some showing only one or two small ducts and a corresponding number of phloem elements, while others show as high as twenty xylem elements. In general, the bundles of the scape are larger than those of the petiole and greater proportionate phloem area, as will be evident from a comparison of TEXT FIGS. 45 and 46 with TEXT FIG. 47.

There is not in any case a distinct bundle sheath, the vascular elements being surrounded by chlorophyll-bearing parenchyma. The presence of chlorophyll in the cells bordering the vascular elements is so marked as to give a striking appearance to cross sections, which show all but the innermost bundles distinctly green.

THE RAPHIDE CELLS

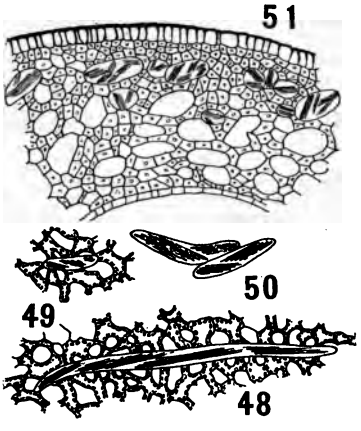
From the first, *A. triphyllum* has been noted for its intensely acrid sap. This feature alone is sufficient to protect its green parts and the corm with its store of starch from the ravages of animals of all sizes. The North American Indians are reported by Havard (**16**, p. 106) to have found that by drying and cooking, the corms could be made edible. Sometimes in laboratories it is considered a lark to cook and eat Indian turnip corms. The writer has found them quite palatable when cut up and boiled for a half hour or more with one or two changes of water.

The irritating principle is the raphides of calcium oxalate which are found abundantly through the plant, and which are always floating free in the sap exuding from wounds. Barnes (**3**) found that by filtering the expressed sap twice through filter paper, and so removing the needle-like crystals, it lost all its acridity. Attempts by the writer to find any volatile oil or other irritating substance have given but negative results.

The raphide-bearing cells are found almost throughout the plant. They have not been found in the mature embryo, in root caps, within limits of vascular strands or in epidermal structures. They are especially plentiful in leaf laminae, fruit, and corm.

In the leaf the specialized cells occur in palisade or spongy tissue and are often close beside veinlets. Here they are for the most part long, more or less sinuous cells with fascicles of crystals extending in the general direction of the long axis of each cell (TEXT FIGS. 48–50). The size and shape of the cells may vary in one part of the plant, as shown in the figures just cited. Even wider variation is to be found in different parts of the plant. In the scape, spadix and petiole the cells are found chiefly near the periphery and are similar to those in the leaf. In the corm some cells ares lightly larger and more globular than those containing starch, and they contain numerous small bundles of raphides

lying in different positions (TEXT FIG. 28 *a*). These cells are much more abundant in the outer portion of the corm. In the endosperm the few raphide-bearing cells are similar to those in the corm but are smaller. In the walls of the ovary and maturing fruit the cells are chiefly in the upper portion, where they form a distinct area (PLATE 2, FIG. 26; TEXT FIG. 51). Probably the most clearly defined raphide region is that in the root. Here, as described in the section on root structure, certain cells in the outer periblem are differentiated shortly above the growing tip and form almost continuous receptacles for long lines of raphide bundles (PLATE 5, FIG. 65). Wherever found the raphide cells are differentiated very early. They rapidly increase in size, retaining their protoplasmic lining and a living nucleus long after the central vacuole has been filled with bundles of crystals.



FIGS. 48–50. Different forms of raphide-bearing cells in the leaf mesophyll. × 52.

FIG. 51. Raphide-bearing cells in the outer portion of the ovary wall. × 52.

SEX DISTRIBUTION

Although *A. triphyllum* is usually considered a dioecious plant, spikes bearing both staminate and pistillate flowers are frequently found. From the examination of hundreds of plants through three consecutive years the writer finds the ratio between staminate and pistillate spikes about 3:2, and 8–10 per cent. of the whole number mixed. The type of a mixture most often found is that of a spike bearing chiefly pistillate flowers and a few staminate flowers at the upper or lower end or at both upper and lower ends (PLATE 1, FIG. 23; PLATE 4, FIG. 55). Usually the number of staminate flowers is less than shown in FIG. 55. Occasionally the ratio is reversed, and a spike shows a few pistillate flowers scattered through a mass of staminate flowers as in PLATE 4, FIG. 60. PLATE 4, FIG. 57, shows

an extreme case with one well developed ovary, apparently with fertilized ovules, borne on a staminate spike near its base. It has been observed that when any considerable number of pistillate flowers are present, the thickened axis characteristic of the pistillate spike is evident. Usually all the flowers borne on mixed spikes are normal in form and functional development. Peculiarities in form and position of staminate flowers are frequent enough for mention. The growth of such flowers on an extension of the spike axis as in PLATE 1, FIG. 22, is not uncommon. A variable number of flowers may appear so, sometimes but two or three, and again enough to give the appearance of a staminate spike above the pistillate as in *A. Dracontium* and other aroids. In a few cases the staminate flowers are borne on long pedicels (PLATE 4, FIG. 59) and show peculiarities of structure. Those forms, along with others showing a tendency to bisexuality, are more fully discussed in the section dealing with teratology.

It has been noted elsewhere that the number of leaves seems to depend upon age and the abundance of food, the older, well-nourished plants producing two leaves, the younger plants but one. There seems to be no relation, however, between the leaf development and the sexuality of the plant, the ratio of pistillate and staminate spikes being about the same with plants bearing one leaf as with those bearing two.

It has been generally recognized by students that the sex of plants of *A. triphyllum* may change. The first published attempt to determine anything experimentally concerning this point was by Atkinson (1). A report of this work was given at the Ithaca meeting of the Society for Plant Morphology and Physiology (December 28–29, 1897). The published abstract is quoted here in full:

"Female, male, and neuter plants, the history of which was known by growing them in pots for one season, were potted, some in rich soil and others in poor soil, the object being to change them from male to female, etc., by varying amounts of nutriment. Male plants in rich soil were in one year changed to female, and large neuter plants in rich soil were changed to female.

"In a second series, two large two-leaved female plants, with large bulbs, were selected at the time the fundament of the flowers

was formed. The bulbs were cut so as to remove all but a small portion in connection with the bud. By this removal of the larger part of the stored food the plants were changed to male."

Gow in 1913 (14) made the statement that these plants probably alternate in sex from year to year. In proof of that theory he stated that plants which had borne pistillate flowers one year produced staminate flowers the next season after being transplanted.

The present writer has made rather extensive attempts to duplicate the experiments of Atkinson, but has encountered two serious difficulties, viz., many of the corms have been partly or wholly destroyed by fungi, and there seems to be no way to determine certainly when the flower initials are being formed. The wide variation in the time of flower development is discussed in another section, and it need only be said here that two plants of a group rarely show the same stage of development, the range in staminate spikes being from bud initials to completed tetrads in late July. This would mean a possible difference of six weeks in the formation of the flower fundaments of plants in one group. From this it is clear that any experiment depending upon uniformity of development would be open to question. The history of the experiments as performed and the results follow. Robust plants which bore purely pistillate spikes were dug up the first week of June, and after having the lower two thirds of the corm cut away and being allowed to form a dry callous by two days' exposure to the sun and air, were planted in rich loam. Through the year these cultures were treated just the same as others that were in every way normal. The following spring a part of these corms produced flowers, and all the flowers were staminate. Their growth was not normal, however, and all the plants were small and variously deformed. Some produced leaves only, and three of the plants produced inflorescences only without leaves. This goes to show merely that the primary effect of the mutilation was a serious disturbance of the general system of nourishment. The same spring some three hundred corms were reset for experimental purposes, the collecting being done in late May and early June. Those plants which had borne only pistillate spikes were carefully kept apart. All were planted in rich, moist loam and watered

occasionally through the year. Of this bunch of plants reset early in the season—before the flowers were formed—but three produced pistillate spikes the next year.

Yet another observation must be noted here. The spring of 1913 was peculiar in southern Indiana because of a flood condition in March and April (a rainfall of 14.34 inches was recorded between March 23 and April 30) followed by extreme drought. The result upon *A. triphyllum* was that by June 1 all plants except those near springs or at the margins of water-courses, were withered and dead. As has been stated above, the usual ratio of staminate to pistillate spikes is about 3:2. A careful count of plants in the spring of 1914 showed among those not near a water supply a ratio of about 70 staminate to 1 pistillate, while among plants near springs, in perennial marshland, and in shaded, damp ravines, the usual ratio held. The change in ratio in passing from the damp bottom of a deep ravine to the top of the side was quite noticeable. Along the waterway the usual number of pistillate flowers were in evidence, while on the upper part of the slope where growth had been checked by the early drought of the previous summer, only staminate spikes could be found. Such a difference is not usual; and it seems that its appearance in 1914 is in some way related to the short growing season of 1913.

It has been observed that the usual ratio between staminate and pistillate spikes holds from year to year in limited areas with a non-failing or late failing water supply. This is true without regard to soil, as shown by colonies growing in leaf mold between limestone fragments, others in deep, rich loam of moist woodlands, and yet others in the poor, recent clay of young ravines. Plants do not grow with equal vigor in the different kinds of soil, but the difference in available food seems to influence the vegetative development primarily, and the sexual development little, if at all. One particular colony of about fifty plants growing on a steep clay bank, slightly shaded, but well watered by seepage from underlying limestone has been observed closely. The plants average 1.5 dm. in height, the largest specimen being 2 dm. high. The petioles are slender and the corms undersized, but the flower spikes show the usual ratio of males and females.

One point from experimental work should be noted here.

Sturdy plants bearing pistillate spikes have been transplanted to beds of gravel and of *Sphagnum*, receiving only such food as was carried by the tap water with which they were abundantly supplied during the growing season. These plants continue to produce pistillate spikes after two years of such treatment. In the meantime the corms of these plants show a marked decrease in size as a result of their failure to store up as much food as is required for the year's growth.

The writer cannot agree with Gow's statement that there is an alternation of sex characters. Several old vigorous plants under observation in favorable situations for five years have not failed to produce pistillate spikes each year. To this it may be added that in cultures of plants grown from seed, the first flowers produced have been staminate. The time of the first change from staminate to pistillate is not fixed although it usually occurs in vigorous plants two or three years after the first flower spike is produced. Subsequent changes in sex may be accomplished without noticeable checking of the vegetative increase of the plant. For example, the early transplanting of corms, while changing the sex for the next year, need not reduce the size or number of leaves produced.

From the observations given above, the following conclusions seem warranted. There is not an alternating or cyclic change in sex in *A. triphyllum*. The amount of food stored in the corm does not determine the sexual condition. The amount of solid food does not determine the sexual condition, but a shortage of water and consequent checking of growth at the time of the beginning of flower formation produces staminate flowers. The checking of growth at that critical time is the important factor introduced by the early transplanting, by the removal of the corms for mutilation by Atkinson and the writer, and by the early drought of 1913, The influences effecting change of sex are not the same as those producing changes in the vigor of vegetative growth.

TERATOLOGY AND VARIATION

Rennert (21) in 1901 gave a brief account of the teratological phenomena recorded for *A. triphyllum*. The notes referred principally to the dedoublement in the case of flowers and leaves

and to monstrous development of spathe or spadix. The most interesting reference, perhaps, is that to a report by Foerste (12) in which there is described a confluence of two leaf petioles and two leaflets and a partial confluence of two inflorescences. Phenomena closely related to this are not rare, and doubtless result from a duplication of initials in the early bud formation. The confluence of parts has been observed in all degrees, and in young and old, sterile and flowering plants. The petioles may be

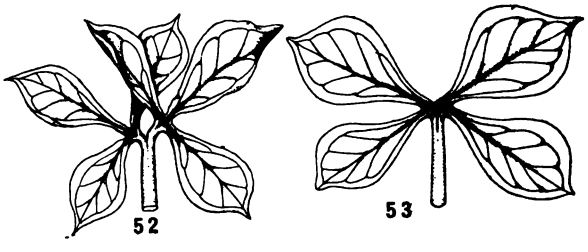


FIG. 52. Two leaves with almost entirely confluent petioles. × one sixth.
FIG. 53. A leaf with four leaflets, one of a group, all of which showed this character. × one sixth.

attached together but a short distance from the corm or the connection may extend almost to the laminae (TEXT FIG. 52). The same is true of inflorescence, the attachment being in any degree from the doubled peduncle and separate spathes to the single spike with two sterile spadix sections as figured by Rennert (21, *f.* 2, *M*), or with a branched spadix as in PLATE 1, FIG. 19.

These peculiar formations are in no way related to the formation of two leaves by the old, vigorous plants, for, in that case, there is no confluence, one leaf initial being inside and of later formation than the other. In normal two-leaved plants the petiole of one leaf is enveloped by the other and the scape surrounded by both (TEXT FIG. 70).

As in seedlings an occasional lobed leaf appears, so in older plants, there is sometimes found a leaf with the leaflets more or less united, usually so that the leaflets appear as lobes of a deeply divided leaf. Such forms are most often seen in two- and three-year-old plants.

Rennert (21) also describes and figures a few clusters in which the spathe has failed to develop, appearing only as a scale below

the flower spike, and another in which the sterile portion of the spadix formed an irregular monstrous form. Plants have been observed by the writer in which the spathes were contorted and reduced in size as the result of evident injury; and the fact that the spathe begins its development before the differentiation of the spadix would make possible an injury which would entirely check the spathe's development at a time when no harm would come to the spadix. As noted in connection with the experiments on change in sex, some plants with mutilated corms produced inflorescence only. One such flower cluster showed a normal spathe with normal staminate spike of flowers, but with a mere knob to represent the sterile spadix. Later two similar specimens were collected in the field.

The only definite report of observations of abnormalities in the form of individual flowers is that of the confluence of the stigmas of two separate ovaries, reported by Rennert (21, p. 248). The occurrence of mixed spikes has been discussed in the section on sex distribution. It was there stated that the staminate flowers found on spikes chiefly pistillate were usually normal and functionally perfect. In some cases, however, the stamens are borne on long pedicels (PLATE 4, FIG. 59) and show either small, sterile anthers or bract-like sterile growths. Many of the stamens formed entirely above a pistillate spike are undersized (PLATE 1, FIG. 22), and some do not mature pollen. Close observation of a large number of flower spikes shows that there are three lines along which the flowers may vary from the normal form. The most common is that just mentioned and represented in PLATE 4, FIG. 59, i. e., the more or less complete transformation of floral into vegetative structures. This is found not only with staminate flowers but is very frequent on otherwise purely pistillate spikes, where the transformed parts appear as more or less convolute bracts (TEXT FIGS. 54, 55). A second line of abnormal development is that represented by the confluence of parts. The confluence of the short filaments of stamens and of anthers was mentioned in the section dealing with the staminate flower. The confluence of stigmas as reported by Rennert has been noted. An extreme case of the last named peculiarity is shown in TEXT FIG. 56, where four distinct ovaries have a common stigmatic brush. Close examination

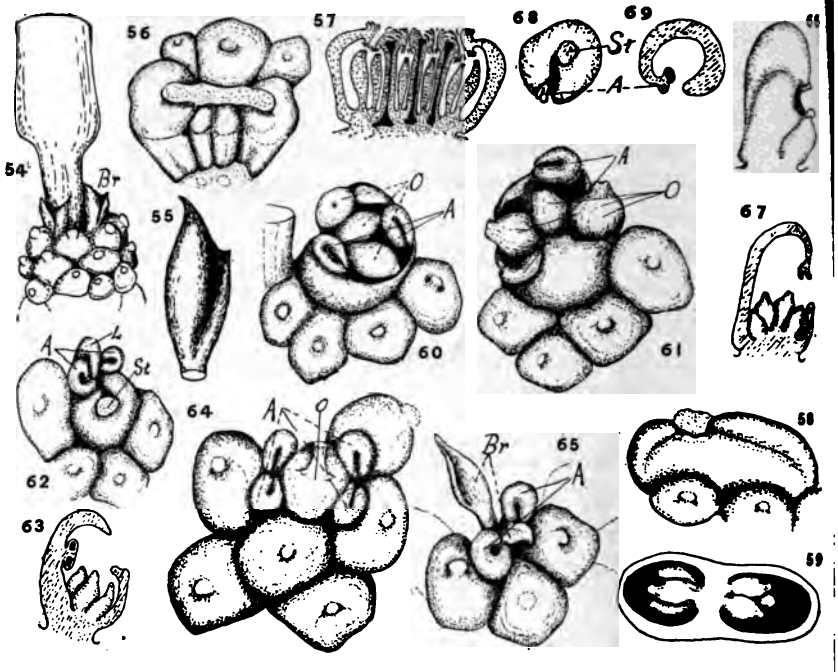


FIG. 54. Top of a pistillate spike, showing sterile bracts, *Br*. × 1.

FIG. 55. One of the bracts shown in 54, enlarged. × 3.

FIG. 56. A group of ovaries with apparently confluent stigmas. × 3.

FIG. 57. A diagrammatic section of group in FIG. 56, showing the ovaries and stigmas really distinct. × 3.

FIG. 58. A double ovary. × 3.

FIG. 59. A cross section of the ovary shown in FIG. 58, showing the ovules attached to the median wall. × 3.

FIGS. 60, 61. Two views of a flower with three functional ovules, *O*, and two functional anthers, *A*, on a partly suppressed ovary wall. × 3.

FIG. 62. A cleft ovary with normal stigmas, *St*; a bract-like lobe, *L*; and two anthers, *A*. × 3.

FIG. 63. A section of the ovary shown in FIG. 62, showing well-developed ovules. × 3.

FIG. 64. A flower with one ovule, *O*, the ovary walls almost entirely suppressed and bearing four anther cells, *A*. × 3.

FIG. 65. A structure without ovary walls, bearing two anthers, *A*, and instead of ovules, two sterile bracts, *Br*. × 3.

FIG. 66. An abnormally developed ovary with functional ovules in the base, but with the style, *S*, unclosed and its surface without stigmatic hairs. × 3.

FIG. 67. A section of the ovary in FIG. 66. × 3.

FIG. 68. A cleft ovary with normal stigma, *St*, and a two-celled anther, *A*, on the wall margin. × 3.

FIG. 69. A cross section of the structures shown in FIG. 68. × 3.

shows structures of this type to be only superficially confluent. TEXT FIG. 57 shows a vertical section of the ovaries shown in TEXT FIG. 56. It seems that the crowding of the young ovaries prevents the usual closing of the stylar opening, and the subsequent development of hairs on the increased stigmatic margin, forms a seemingly continuous brush. A better example of true dedoublement is shown by the two-celled ovary figured in TEXT FIGS. 58, 59.

A third line of divergence leads towards bisexual flowers. As might be expected, many such flowers are found on spikes bearing both staminate and pistillate flowers. The specimens here described, with many other similar forms, were collected in the field, where they had grown under usual conditions. TEXT FIGS. 60, 61 show two views of a flower with a partially developed ovary wall, three normal ovules, and two functional anther cells. TEXT FIGS. 62, 63 show an ovary with normal stigma and ovules, and with two functional anther cells on a lobe of the ovary wall. TEXT FIG. 64 shows a flower with the ovary wall almost entirely suppressed, four functional anther cells and an unusually large ovule. TEXT FIG. 65 shows a flower with two functional anther cells, and instead of ovules, two sterile bracts similar to those in TEXT FIGS. 54, 55. TEXT FIGS. 66, 67 show a flower with an unusual ovary wall suggestive of that in TEXT FIG. 62, and with functional ovules, but without any anther. In TEXT FIGS. 68, 69 is shown a cleft ovary wall with normal stigma and two sterile anther cells, but with ovules entirely suppressed. It should be noted that in all bisexual flowers examined the anther formation has been connected with the ovary wall. In no case has there been found a suggested transition from ovule to anther, even when the ovule shows degeneracy, as in TEXT FIG. 65, or suppression as in TEXT FIGS. 68, 69.

Quite distinct from the abnormalities just described are the following. A group of ten plants, probably arising from one corm and its offshoots, was found with leaves having four leaflets as shown in TEXT FIG. 53. The plants were of medium size with normal inflorescence and leaves normal as to size, surface, and texture. All the plants showed a severe attack of *Uromyces Caladii* and died before another growing season made possible farther

examination and breeding experiments. On a damp, thickly wooded hillside near Trevlac, Brown County, Indiana, in the last four years about a dozen specimens have been found, each bearing two leaves and two flower clusters (PLATE 3, FIG. 47). There is no unusual character other than the production of the two flower clusters. These are of the same sex on each plant and are entirely independent, arising from two separate initial groups (TEXT FIGS. 71, 72). A few plants of a third form, having leaflets with a shining glabrous lower surface and petiolules 2–3 cm. long, have been found in the neighborhood of Bloomington, Indiana. Whether or not these are simply variant forms, true mutants or distinct varieties cannot be said until a more careful study and possibly breeding experiments can be made.

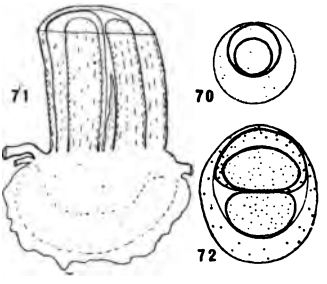


FIG. 71 is diagrammatic section of corm and bases of leaves and scapes of two-flowered plant, to show the distinct origin of the scapes. × ¾.

FIG. 72. Semidiagrammatic cross section of petioles and scapes of plant figured in PLATE 3, FIG. 47, and TEXT FIG. 71.

FIG. 70. Semidiagrammatic cross section of normal two-leaved plant to show position of petioles and scape.

THE RELATION TO UROMYCES CALADII

The only fungus parasitic upon *A. triphyllum* as reported by Saccardo is *Uromyces Caladii* Farl. Without going into a detailed account of the fungus, some observations of its influence upon the host under consideration may be given. The aecidia occur on the lower leaf surface, rarely on the upper, on petioles and scape, on both surfaces of the spathe and occasionally on the ovary walls and sterile spadix. The cups appear with or soon after the appearance of the leaves and flowers in spring. When the infection is severe, the parts attacked are deformed, the leaves being small and more or less rolled up, the spathe thickened and its hood shortened and erect, and the spadix is sometimes two to three times its normal size. The spermogonia have been found on the leaves and in the ovaries. Usually the spermatia are discharged

into the ovary cavity and float about in the slime there. Ovaries have been sectioned showing the micropyles filled with these bodies. Occasionally in this region teleutospores are formed in small scattered groups on the leaf surface.

Generally the floral parts suffer first and most from this fungus, although some plants are found with the growth evident only on the leaves. The affected plants are earlier in seasonal development than uninjured plants, as reported by Rennert (21, p. 250). Infected pistillate flowers develop early and the ovaries enlarge as after fertilization, but, as far as the writer's observations go, do not produce seed. It is a question whether or not normal embryo-sacs are developed. Plants once infected may live two or three seasons, but finally succumb to the ravages of the parasite. The appearance of rust on plants in culture the year following an early transplanting and removal of all stalks and leaves from the corm suggested the presence of perennial mycelium in the corm. Later examination of corms of infected plants has shown abundant mycelial threads in both the body of the corm and the terminal bud. Halsted (15) in 1894 made a brief report of observations on the distribution of the aecidia and teleutospores of *U. Caladii* on *A. triphyllum* but did not suggest the perennial nature of the mycelium.

SUMMARY

The additions and corrections presented in the present work may be briefly summarized as follows:

There is a very wide range in the time of development of the flowers, and a marked tendency toward the earlier development of staminate flowers.

The tapetal nuclei wander among the developing pollen spores in the anther cavity.

The ovule and the embryo-sac are of the lily type.

The ovary cavity is filled at maturity with slime produced by special hairs of the inner stigmatic brush.

A well-developed and complex permanent suspensor system is evident.

One daughter of the primary endosperm nucleus (fusion nucleus) undergoes two to four divisions while migrating to the micropylar end of the embryo-sac, and the resulting free nuclei

without taking a peripheral position initiate the endosperm formation by producing cross walls in various planes. Later endosperm growth is brought about primarily through the activity of a definite meristematic region.

The second daughter of the primary endosperm nucleus does not divide but organizes the residual cavity of the embryo-sac into a large nutritive cell which elaborates food material for the growing endosperm.

Pollination is secured by insect visitation. An unknown attraction for insects is evident in the pistillate inflorescence.

Primary roots of seedlings are diarch in structure. Secondary roots of seedlings and all roots of mature plants show a three- to five-radiate structure.

A small percentage of seedlings regularly do not produce functional plumules the first season.

The sex of mature plants is changeable, and the amount of water available at a certain period in development is directly or indirectly responsible for such change.

Abnormal flowers showing a tendency toward bisexual structure have been found.

The corms may harbor perennial mycelium of *Uromyces caladii*.

The writer wishes to express his deep appreciation of the kind interest and helpful suggestions of Professor D. M. Mottier of Indiana University, under whose direction the present work has been done.

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EXPLANATION OF PLATES 1–5

PLATE 1

FIG. 1. A nucellus with two completed tetrads of megaspores, five of which are germinating. × 210.

FIG. 2. Two tetrads of megaspores showing the lowest spore of each tetrad growing at the expense of the others. × 210.

FIG. 3. An embryo-sac with but little difference between synergids and egg cell, and the antipodals partly shrunken. × 210.

FIG. 4. A mature embryo-sac with an egg cell extending far below the synergids. × 210.

FIG. 5. A normal egg apparatus. × 600.

FIG. 6. An embryo-sac shortly after fertilization, showing one synergid, *Sy*, intact, the residual nucleus, *R*, and migrating nuclei, *E*, which have resulted from free divisions of one daughter of the primary endosperm nucleus. × 105.

FIG. 7. Whole upper portion of an embryo-sac shortly after fertilization, showing the nucellar cap, *N.C.*, two persistent synergids, *Sy*, the first division of the egg nucleus, *E*, the first mass of endosperm cells and the beginning of a plate formation at *P* by the division of cells. × 210.

FIG. 8. A proembryo with a divided suspensor, *Su*, and a four-celled embryo. (One cell entirely cut away.) × 210.

FIG. 9. A fertilized egg, *E*, and two synergids, *Sy*, imbedded in one large endosperm cell. × 210.

FIG. 10. A proembryo with one large suspensor cell, *Su*, and three embryo-cells resulting from nearly transverse divisions. × 210.

FIG. 11. Upper end of an embryo-sac showing remnants of nucellar cap, *N.C.*, path of the pollen tube, *PT*, and proembryo consisting of one suspensor cell, *Su*, and one embryo cell. *E*, *E*, *E* are the uppermost cells of the young endosperm. × 210.

FIG. 12. A proembryo with the suspensor cell, *Su*, divided before the first division of the embryo cell has occurred. × 210.

FIG. 13. A proembryo showing a divided suspensor and two embryo cells resulting from a vertical division. *Sy*, persistent synergid. *PT*, path of pollen tube. × 210.

FIG. 14. A proembryo with single suspensor cell, *Su*, two embryo cells resulting from a vertical division, the whole surrounded by the two large endosperm cells. × 210.

FIGS. 15, 16. Single berries from spike in Fig. 21. × 1.

FIG. 17. Longitudinal section of a berry, showing seeds in position. × 1.

FIG. 18. Cross section of a berry with five seeds. × 1.

FIG. 19. Upper portion of a pistillate spike and branched sterile spadix. × 1.

FIG. 20. A longitudinal section of a fruit cluster. × 1.

FIG. 21. A mature spike or fruit cluster with a few berries removed. × 1.

FIG. 22. A pistillate spike with a few isolated staminate flowers, male, above. × 1.

FIG. 23. A spike chiefly pistillate, with staminate flowers at both top and bottom. × 1.

PLATE 2

FIG. 24. Section of inner stigmatic brush and adjoining parts of the ovary, showing wax-filled hairs, *w*, *w*. × 42.

FIG. 25. Meristematic region, *M*, just above the lower border of the endosperm. × 42.

FIG. 26. Longitudinal section of style showing reduced papilla-like hairs, *P*, within. *R*, raphide cells. × 42.

FIG. 27. Longitudinal section of an ovule having a sterile nucellus, showing the changes in the integuments at the time of maturity of embryo-sacs in neighboring ovules. × 52.

FIG. 28. Bottom of an embryo-sac just after maturity, showing decomposition of nucellar tissue, *N*, and great elongation of contiguous cells, *I*, of the inner integument. × 52.

FIG. 29. A cross section of an almost mature anther. × 42.

FIG. 30. Longitudinal section of upper portion of embryo-sac shortly after fertilization, showing the mass of young endosperm, *E*, and the shrunken protoplasmic lining, *L*, of the residual cavity. × 52.

FIG. 31. Longitudinal section of a swollen embryo-sac surrounded by the inner integument. *A*, the egg cell with the nucleus just divided, *E*, the endosperm, *R*, residual nucleus in the greatly enlarged cavity. × 52.

FIG. 32. Residual nucleus shown in FIG. 31. × 160.

FIG. 33. Longitudinal section of mature ovary, showing the stigmatic hairs at outer and inner end of style and the slime, *s*, in the cavity. × 15.

PLATE 3

FIGS. 34–38. Stages in the opening of a plumule leaf. × ⅔.

FIG. 39. A normal first year leaf. × ⅔.

FIGS. 40–42. Opening of second year leaf. 40, × ½; 41 and 42, × 1.

FIG. 43. A three-lobed first year leaf. × ⅔.

FIGS. 44, 46, 52. Unfolding of leaves of mature plants. × ¼.

FIG. 47. A plant bearing two flower clusters. × ⅛.

FIG. 48. Diagrammatic section of corm, showing terminal bud, *B*, lateral bud, *LB*, and starch mass, *S*, to be absorbed during the season.

FIG. 49. Third year corm. × 2.

FIGS. 50, 51. Mature corms drawn out of a vertical position by root contraction. × ⅓.

FIGS. 53, 54. Diagrammatic cross section of leaves in buds of mature plants. *S*, scape.

PLATE 4

FIG. 55. A flower spike with almost equal numbers of pistillate and staminate flowers. × 1.

FIG. 56. A bud dissected out of a 90 g. corm, August 14. × 1½.

FIG. 57. A staminate spike with one pistillate flower, *O*, near the base, and probably containing fertilized ovules. × 1.

FIG. 58. A group of average seedlings. × ½.

FIG. 59. A pistillate spike with imperfect staminate flowers on long filame at the top. × 1.

FIG. 60. A staminate spike with scattered pistillate flowers. × 1.

FIGS. 61, 62. Corms at the end of the first growing season. × 1. Most of those in FIG. 61 are probably from blind germinations.

PLATE 5

FIG. 63. Cross section of root tip just above the calyptrogen. *C*, root cap *P*, plerome; *R*, raphide cells. × 70.

FIG. 64. Cross section of root tip about 1 mm. above FIG. 63. Parts lettered as in FIG. 63. × 70.

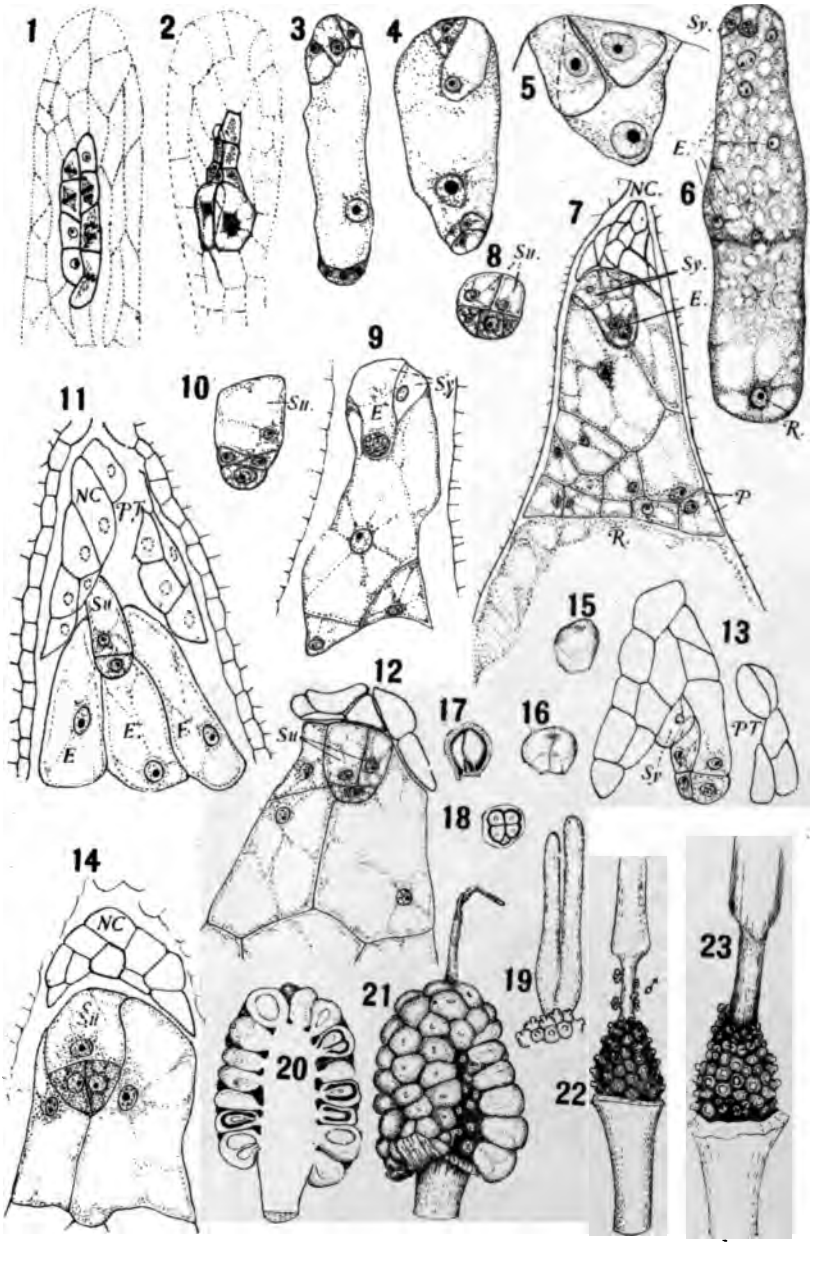
FIG. 65. A part of a longitudinal section of a root tip showing the beginning of raphide cells, *R*. × 70.

FIG. 66. Cross section of a five-rayed stele. × 60.

FIG. 67. Longitudinal section of a root, showing regional divisions and young raphide cells, *R*. × 35.

FIG. 68. Longitudinal section of a mature, contracted root, showing the folding and twisting of the stele after sectioning. The cells of the sheath, *B*, show no distortion. × 25.

FIG. 69. Mature corm, showing extensive root system and two buds, *B*, which have formed leaves while attached to the parent plant. × ⅓.



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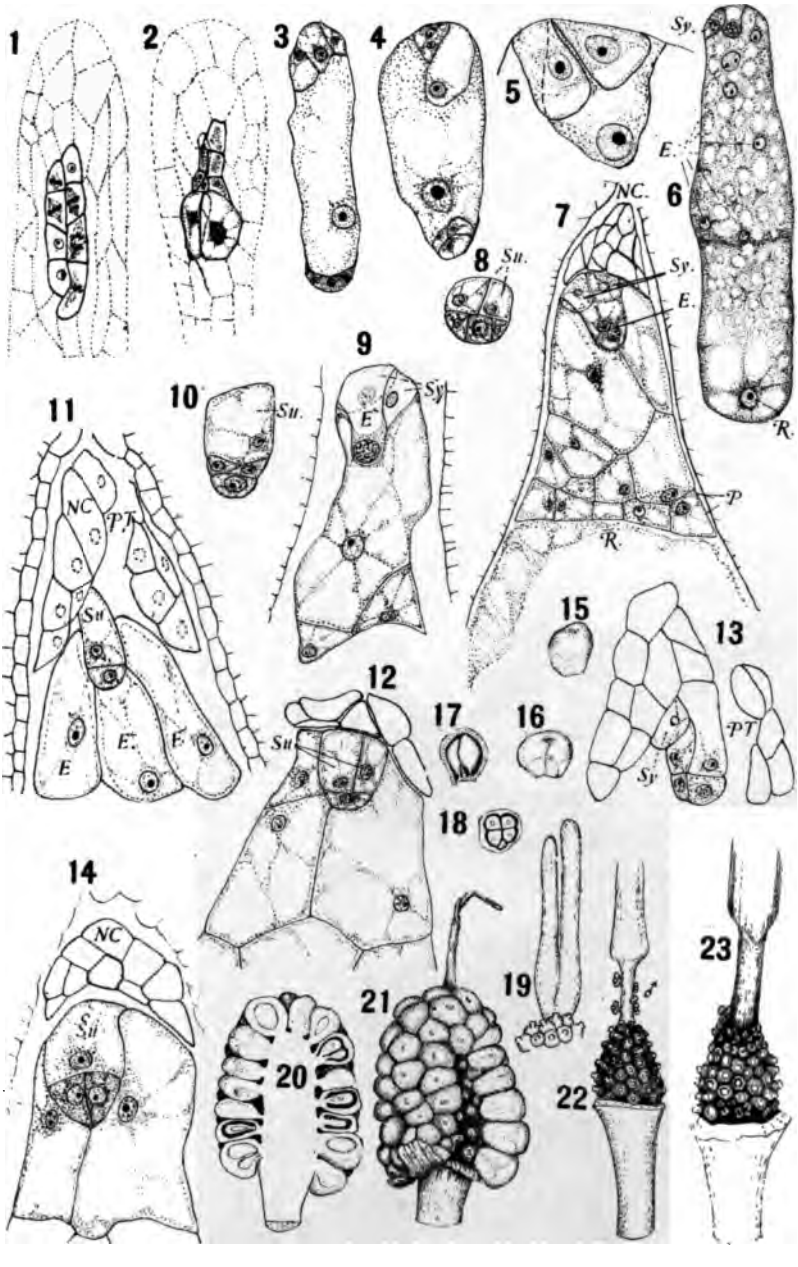

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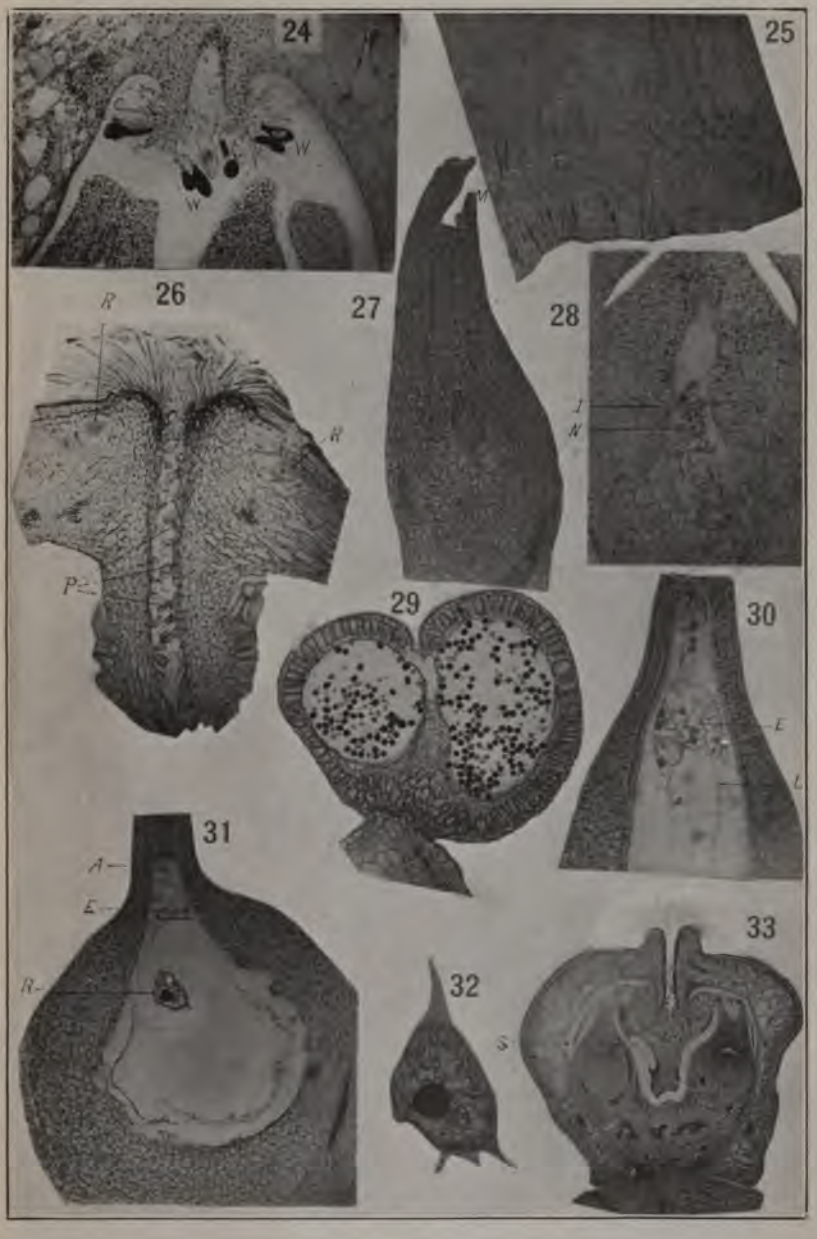

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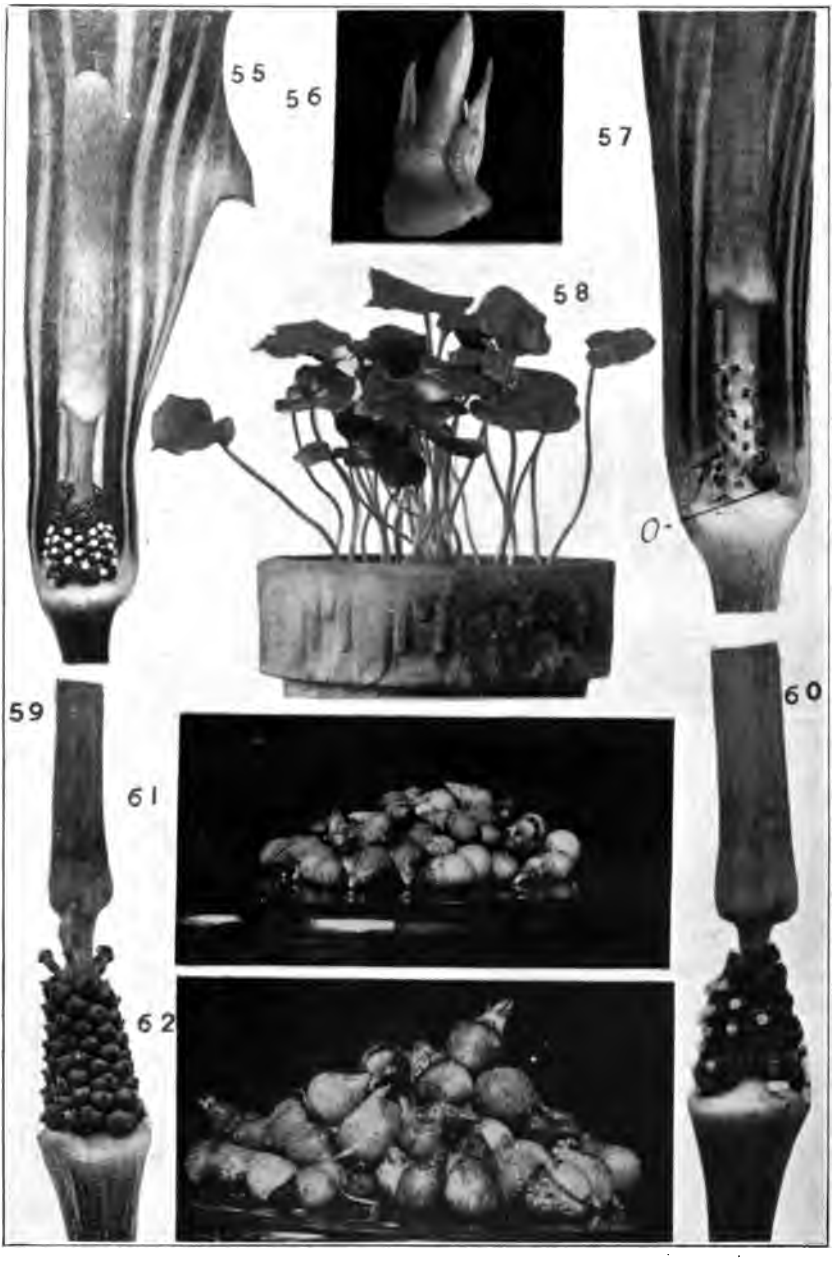

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PICKETT: ARISAEMA TRIPHYLLUM

Descriptions of Cuban Plants New to Science

NATHANIEL LORD BRITTON

The following descriptions of plants new to the Cuban Flora are drawn mostly from specimens collected in recent years on the several expeditions made under the auspices of the New York Botanical Garden and from those collected by Brother Léon of the College of La Salle, Vedado, Havana, and his associates. Brother Léon has contributed descriptions of some grasses; Dr. John H. Barnhart the Lentibulariaceae; Dr. Francis W. Pennell the Scrophulariaceae; Dr. S. F. Blake has cooperated with some Carduaceae; Dr. Rydberg has contributed a new genus of Fabaceae and Mr. Percy Wilson has assisted at many points.

Family POACEAE

Paspalum Rocanum *Fr.* Léon, sp. nov.

Perennial from a short rhizome; stems simple, erect or ascending, 40–60 cm. long, sometimes more; nodes appressed-pubescent; sheaths glabrous, sometimes papillose-ciliate, the lower ones overlapping and often purplish; ligule membranaceous, 2.4–2.8 mm. long; blades glabrous on both surfaces, conduplicate, acuminate and involute towards apex, rarely flat, up to 25 cm. long, 2–8 mm. wide, firm, erect, somewhat curved; racemes 2 to 4, somewhat divergent, straight or curved, 5–9 cm. long, the common axis 2–4.5 cm. long; rachis 1.5–2 mm. broad, with long hairs at base, otherwise glabrous; spikelets normally in pairs, sometimes crowded, one of the pedicels as long as or longer than the spikelet; spikelets yellowish-green, becoming rufous at maturity, glabrous, 2.1–2.5 mm. long, 1.3–1.6 mm. wide, oval to obovate; glume and sterile lemma equal, short-pointed, 3-nerved; fruit pale, minutely roughened.

Palm barren, sabana de Motembo, Santa Clara (*Léon & Roca 8233*), is the type, preserved in Colegio De La Salle Herbarium, Vedado, Havana.

Sabana del Jacán, near San Miguel de los Baños, Matanzas (*Léon & Roca 8871*).

MEMOIRS OF THE TORREY BOTANICAL CLUB, VOL. 16, NO. 2. Issued September 10, 1920.

Paspalum Edmondi *Fr.* Léon, sp. nov.

A small tufted perennial with short rhizomes and numerous slender pubescent leafy branching stolons; stems simple, very slender, compressed, glabrous, 2–6 cm. long; leaves crowded at the base; sheaths pilose; ligule membranaceous, 0.5–1 mm. long; blades lanceolate to linear, pilose on the upper surface towards the base and near the lower margins, glabrous beneath, 1–1.5 cm. long, sometimes up to 6 cm. long in the specimens grown in a rich soil, 1–2 mm. wide, flat or somewhat involute towards apex; racemes solitary, up to 12 mm. long, usually about 6 mm., with a tuft of hairs at the base; rachis 0.5–0.7 mm. wide, glabrous; pedicels shorter than the spikelets; spikelets solitary, with a short wing along the pedicel, somewhat imbricate, 1.5–2 mm. long, 1–1.2 mm. wide, ovate, abruptly acuminate-pointed; first glume wanting, second glume glabrous, often transversely wrinkled, 7-nerved, conspicuously pointed; sterile lemma glabrous, more or less deeply hollowed between the strongly elevated, rugose, sometimes tubercled margins, nearly as long-pointed as the second glume; fruit blunt, brown, slightly papillose, 1.4 mm. long, 1 mm. wide.

Palm barren, sabana de Motembo, Santa Clara (*Léon & Edmond 8607*).

Specimens from the same locality were transplanted in Vedado, Havana (*Léon & Edmond 8682*). The type specimens are preserved in the Colegio De La Salle Herbarium, Vedado, Havana.

Paspalum acutifolium *Fr.* Léon, sp. nov.

Perennial, tufted; culms simple, erect or ascending, glabrous, compressed, nearly naked, much exceeding the leaves, these densely crowded at the base; nodes clothed with long white hairs; sheaths striate, keeled, mostly overlapping, glabrous, sometimes sparsely hispid towards the summit, hirsute-ciliate, the upper ones bladeless or nearly so; ligule membranaceous up to 2 mm. long; blades firm, rarely over 15 cm. long, 4–8 mm. wide, sparsely papillose-hispid on both surfaces and the margin when young, mostly flat or conduplicate, sometimes twisted, involute towards apex, the middle nerve prominent beneath; inflorescence terminal; racemes 2 to 4, the common axis 1–3.5 cm. long, with long white hairs at base; racemes straight or slightly curved, divergent, rarely spreading; rachis about 1 mm. wide, bearing a few long hairs at the base, otherwise glabrous; spikelets normally in

pairs, crowded towards the summit, only one developed in the lower pairs, the other rudimentary or wanting; spikelets about twice as long as the pedicel, elliptic, 1.6–1.8 mm. long, 1 mm. wide, more or less crimson; second glume and sterile lemma subequal, with some spreading hairs near the margin, otherwise glabrous; fruit pale, somewhat exceeding the second glume at maturity; palea somewhat papillose-roughened.

Palm barren, sabana de Motembo, Santa Clara (*Léon & Roca 8164*). The type specimen is preserved in the Colegio De La Salle Herbarium, Vedado, Havana.

Family CYPERACEAE

Cyperus camagueyensis Britton, sp. nov.

Perennial; culms tufted, slender, smooth, trigonous, erect, 3–6 dm. high. Basal leaves much shorter than the culm, 1–1.5 dm, long, 3 mm. wide or less, those of the involucre several, the longer ones much surpassing the simple, several-rayed umbel; umbel-rays very slender, 5 cm. long or less; spikelets loosely spicate, 1.5–3 cm. long, flat, many-flowered, the rachis angular, wingless, persistent after the scales have fallen; scales oblong-lanceolate; brown, appressed, acute, 1.5 mm. long; stamens 2 or 3; style-branches 2, filiform; achenes oblong, grey, smooth, apiculate, 0.75 mm. long, nearly 0.5 mm. thick, persistent.

Vicinity of La Gloria, Camaguey (*Shafer 196*).

Cyperus Underwoodii Britton, sp. nov.

Culms densely tufted, slender but rigid, erect, arching or recurved, 1–4 dm. long. Basal leaves 1–5 cm. long, or reduced to sheaths, those of the involucre 1–3, the longest about 7 cm. long or shorter, sometimes only 1 cm. long or less; spikelets few or several in a dense terminal cluster, nearly terete, 5–10 mm. long, few-flowered; scales brown, striate, oval, obtusish, appressed, about 2 mm. long; achene linear-oblong, trigonous, apiculate, 2 mm. long, about 0.5 mm. thick.

Dry soil, vicinity of Santiago, Oriente (*Underwood 1694*).

Eleocharis Shaferi Britton, sp. nov.

Perennial; culms capillary, weak, densely tufted, about 2 dm. long; upper sheath apparently not scarious; spikelet oblong, 4–5 mm. long, 1–1.5 mm. thick, acute, few-flowered; scales pale, appressed, obtuse or obtusish, oblong or oblong-lanceolate, appressed, the lower one 2–2.5 mm. long, shorter than the upper

ones; bristles 4–6, brownish, about as long as the achene and tubercle; style-branches 2; achene black, lenticular, oblong, 1 mm. long; tubercle sharply conic, one-fourth as long as the achene.

Bog-holes in wet thicket, Sierra Nipe near Woodfred, Oriente (*Shafer 3414*).

Eleocharis minutissima Britton, sp. nov.

Culms capillary, weak, densely tufted and matted, only 1.5–3 cm. high. Spikelets ovoid, 2–4-flowered, acute, 1 mm. long; scales ovate, acute, with a narrow dark brown central band and broad hyaline margins; achene 0.25 mm. long, cancellate and longitudinally ribbed, gray, oblong-ovoid; tubercle black, low-conic; bristles none.

Border of a lagoon near Pinar del Rio (*Britton & Gager 6965*).

Fimbristylis ophiticola Britton, sp. nov.

Perennial; culms tufted, glabrous, 5 cm. high or higher. Leaves mostly basal, shorter than the culm; spikelet solitary (or sometimes 2?), ovate, flat, several-flowered, acutish, 6–12 mm. long, 2–4 mm. wide; scales ovate, somewhat spreading, yellow-brown, shining, acute or acutish, faintly nerved, readily deciduous from the deeply pitted rachis; style-branches 2; style compressed pubescent. deciduous; achene obovate, nearly white, 0.5 mm. long, flat, longitudinally striate and transversely barred.

Serpentine palm-barren, between Camaguey and Santayana, Camaguey (*Britton 2429, type*); a plant from the vicinity of Guanabacoa, Havana (*Father Roca No. 1*), much larger than the type specimen but without achenes, may belong here.

Family AMARYLLIDACEAE

Hymenocallis praticola Britton & Wilson, sp. nov.

Leaves linear-lanceolate, 3–3.8 dm. long, 1.5–2.8 cm. broad, acute at the apex, gradually narrowing below, sessile. Scape slender, 2–3 dm. tall; flowers 6 or 7 in an umbel, sessile; outer spathe-valves deltoid-lanceolate, 3.5–4.5 cm. long; perianth-tube slender, 7–11 cm. long, the lobes linear, 6.5–9 cm. long, shorter than the tube; staminal crown funnel-shaped, 2–2.5 cm. high, toothed on the edge between the free tips of the filaments, which are 3–4 cm. long; anthers linear, 1.2–1.5 cm. long; style slender, longer than the anthers.

Wet savanna, Sagua, Santa Clara (*Britton & Wilson 370, type*); also collected at Cieneguita, Santa Clara (*Combs 345*).

Family ORCHIDACEAE

Vanilla savannarum Britton, sp. nov.

Climbing on palms; stem slender, branched, 6 m. long or longer. Leaves ovate to ovate-lanceolate, 6–10 cm. long, 3–5 cm. wide, bluntly acute or obtuse at the apex, rounded at the base, many-veined, the petioles about 5 mm. long; peduncles short, 4–8 cm. long, leafy-bracted; spike 6 cm. long or less, densely several–many-flowered; capsules sub-cylindric, sessile, 4–5 cm. long.

On *Copernicia,* savannas near Camaguey (*Britton & Cowell 13120, type*); on *Copernicia,* barren savannas southeast of Holguin, Oriente (*Shafer 2944*); on *Copernicia,* savanna south of Sierra Cubitas, Camaguey (*Shafer 1831*); on palmetto, between La Gloria and Columbia, Camaguey (*Shafer 615*); on palmetto, Jatovieja, Cayo Sabinal, Camaguey (*Shafer 1072*).

Family PIPERACEAE

Peperomia similis Britton, sp. nov.

Stem rather slender, creeping, sparingly branched, 4 dm. long or longer, about 2 mm. thick, sparingly pubescent in lines of curled hairs. Leaves alternate, firm in texture, orbicular-ovate, 3 cm. long or less, glabrous or nearly so, copiously black-dotted, obtuse or acutish at the apex, rounded or subtruncate at the base, inconspicuously 5-nerved, the rather stout petioles 3–8 mm. long; young spikes terminal, solitary, short-peduncled, about 8 cm. long and 2 mm. thick, the bracts rounded.

On a rock, bank of arroyo, Sierra del Indio, San Diego de los Baños, Pinar del Rio (*Brothers Léon and Charles 4984*).

Peperomia cueroensis Britton, sp. nov.

Peperomia spathophylla monteverdensis C. DC. in Urban, Symb. Ant. 3: 228. 1902.

Stems stout, branched, 3 dm. long or less. Leaves thick and firm, elliptic to ovate or obovate, 3–7 cm. long, obtuse or some of them acute at the apex, narrowed or obtuse at the base, faintly 3-nerved, loosely pubescent when young, soon glabrous, not black-punctate; spikes solitary, very long, terminal, about 25 cm. long, 2–2.5 mm. thick; bracts oval, distant.

Mountains of Oriente; type collected on rocks in a ravine, 420 m. altitude, near El Cuero, Oriente (*Britton & Cowell 12761*).

As grown at The New York Botanical Garden, the young leaves are always pubescent, but become glabrous soon after reaching their full size.

Family URTICACEAE

Pilea sumideroensis Britton, sp. nov.

Fleshy, bushy, glabrous, branched, 2.5–4 dm. high, the branches stout, ascending, the main stem nearly 1 cm. thick. Leaves thick, fleshy, obovate, 6–18 mm. long, entire, obscurely pinnately about 5-veined, rounded at the apex, cuneate at the base, the margins revolute, the upper surface densely covered with linear raphides, the under surface finely reticulate when dry, the very slender petiole 9 mm. long or less.

Top of high cliff, limestone hills, vicinity of Sumidero, Pinar del Rio (*Shafer 13816*). Described from sterile specimens, but apparently not referable to any previously known species.

Pilea (?) **carnosa** Britton, sp. nov.

Shrubby, erect, fleshy, 5 dm. high, the stems white. Leaves thick, nearly orbicular, 6–12 mm. broad, faintly 3-nerved, rounded at the apex, rather abruptly narrowed at base into slender petioles 8 mm. long or less.

Cliff, at 160 m. altitude, Ensenada de Mora, Oriente (*Britton, Cowell & Shafer 12967*).

A curious plant, referred to this genus with hesitation.

Pilea sevillensis Britton, sp. nov.

A slender vine, 3 dm. long or longer, creeping on the bark of trees, somewhat branched, the young twigs and petioles sparingly pubescent. Leaves oval or suborbicular, 1.5 cm. long or less, those of each pair nearly of the same size, 3-nerved, entire, rounded at the apex, obtuse at the base, the linear raphides inconspicuous above, prominent and loosely scattered beneath, the slender petioles 5–12 mm. long; stipules semi-orbicular, 2–3 mm. broad; cymes few-flowered, shorter than the leaves; achene about 1.5 mm. long.

Cañon, Upper Guama River, Sevilla Estate, near Santiago, Oriente (*Taylor 183*).

Pilea trinitensis Britton, sp. nov.

Decumbent, glabrous or minutely puberulent, branched, about 7 dm. long. Leaf-pairs, unequal; petioles slender, those of the larger leaves 2–4 cm. long; leaf-blades oblong-lanceolate, 7 cm. long or less, 3-nerved, entire, ciliate, acuminate at the apex, acute or obtuse at the base, rather thin in texture, the underside densely covered with minute linear raphides, the upper surface minutely papillose; staminate inflorescence glomerate-paniculate, nearly as long as the upper leaves; pistillate flowers paniculate, the panicles much shorter than the leaves.

On rocks, Los Cocos, near Siguanea, Trinidad Mountains, Santa Clara, 430 meters altitude (*Britton & Wilson 5075*).

Pilea neglecta Britton, sp. nov.

Stem slender, densely covered with linear raphides. Leaves oblong to oblong-lanceolate, membranous, acute, entire, 3-veined, glabrous, the pairs unequal in size and unequally petioled; larger leaves 5 cm. long, 1.5 cm. wide, with petioles 1 cm. long; smaller leaves 2.5 cm. long, 1–1.2 cm. wide, with petioles 3 mm. long; raphides of upper leaf-surfaces linear-filiform, very numerous and approximate, those of under leaf-surfaces thicker, bright white, numerous, but not close together; peduncles filiform, about as long as the longer petioles; inflorescence paniculate, much shorter than the leaves, the flowers sessile in small clusters; achene oval, apiculate, scarcely 0.5 mm. long.

Cuba, *C. Wright 2233*, in part, in herbarium of the Missouri Botanical Garden.

Pilea siguaneana Britton, sp. nov.

Stems stout, decumbent, 3–5 dm. long, glabrous. Leaf-pairs equal or nearly so; leaves lanceolate or oblong-lanceolate, entire, 3-nerved, 6–10 cm. long, 2–4 cm. wide, long-acuminate at the apex, obtuse or rounded at the base, the upper side covered with minute linear raphides, the underside bearing oblong, thick, white raphides, scattered or somewhat clustered; petioles 1–2 cm. long; staminate flowers densely capitate in globose heads about 6 mm. in diameter, on slender axillary peduncles 1–2 cm. long.

Bed of stream, Siguanea, Trinidad Mountains, Santa Clara, 400 meters altitude (*Britton & Wilson 4979*).

Pilea Clementis Britton, sp. nov.

Woody; stems ascending or straggling, simple or branched, 3–4 dm. long. Leaf-pairs nearly equal, but their petioles unequal

in length; blades ovate-lanceolate, entire, 4–6 cm. long, 2 cm. wide or less, acuminate at the apex, rounded or obtuse at the base, strongly 3-veined with a very slender vein on each side near the margin; staminate flowers subcapitate at the ends of filiform peduncles which are mostly as long as the petioles or longer, the heads about 6 mm. in diameter; pistillate flowers in small panicles on peduncles much shorter than the petioles; achene compressed, ovate, acute, pale, about 0.5 mm. long.

River-banks, Banao Mountains, Santa Clara (*Brothers Léon and Clement 4055, type; 5342*).

Pilea bullata Britton, sp. nov.

Erect-decumbent, with rather stout, pilose-pubescent stems 1–2.5 dm. long. Leaves ovate, 4 cm. long or less, coarsely crenate, obtuse or bluntly acute at the apex, obtuse or rounded at the base, glabrous and with very numerous, approximate, minute, linear raphides above, pilose-pubescent on the prominent veins beneath, the unequal pilose petioles 2 cm. long or less; stipules ovate, about 3 mm. long; inflorescence glomerate-paniculate, as long as the leaves or shorter; achene ovate, acute, about 0.5 mm. long.

Damp woods among stones, between Bahia Honda and El Rosario, Pinar del Rio (*Shafer 12018*).

Family PORTULACACEAE

Portulaca cubensis Britton & Wilson, sp. nov.

Perennial, 2–7 cm. high. Leaves oblong to elliptic, 3–4.5 mm. long, 1–2 mm. broad, rounded at the apex, acutish at the base, fleshy, the axils sparingly short-pilose; flowers mostly solitary; corolla yellow; sepals ovate-lanceolate, 5–5.5 mm. long, 3 mm. broad at the base; petals obovate, 8–10 mm. long, 2–3.5 mm. broad, rounded at the apex, cuneate at the base; capsule circumsessile at about the middle; seeds blackish.

Type collected in palm-barrens, Motembo, Santa Clara (*Léon & Roca 8419*).

Family MENISPERMACEAE

Hyperbaena acutifola Britton, sp. nov.

A small tree with slender gray twigs. Leaves oblong-elliptic, coriaceous, 4–9 cm. long, 2–4 cm. wide, finely reticulate-veined on both sides with the midvein rather prominent, sharply acute at

the apex, narrowed at the base, the petiole 8–16 mm. long; inflorescence lateral, shorter than the leaves, pubescent; fruit compressed subglobose, black, about 12 mm. in diameter and 8 mm. thick.

Dry soil between Banao and Rincon, Santa Clara (*Shafer 12177*).

Hyperbaena littoralis Britton, sp. nov.

A tree 5–8 m. high, or shrubby, the twigs slender. Leaves oval to suborbicular, coriaceous, shining, 3.5–8 cm. long, 3–5 cm. wide, finely reticulate-veined on both sides, with the midvein rather prominent, rounded, mucronate or rarely acute at the apex, obtuse or somewhat narrowed at the base, the petiole 5–10 mm. long; inflorescence lateral, pubescent, shorter than the leaves; flowers sessile, green, about 2 mm. broad; fruit black, much compressed, about 1 cm. in diameter.

Coastal woods, hills and thickets, Oriente, Camaguey, Santa Clara. Type from Guajimica, Santa Clara (*Britton, Earle & Wilson 5991*).

Family ANNONACEAE

Xylopia Roigii P. Wilson, sp. nov.

A shrub or small tree, the young twigs brown, strigillose with short, appressed hairs; leaves oblong-elliptic or obovate, 3.5–7 cm. long, 1–2.4 cm. broad, rounded or somewhat acutish at the apex, cuneate at the base, glabrous and somewhat lustrous above, dull and minutely strigillose beneath with short, appressed hairs, short-petioled; flowers immature; calyx about 4 mm. broad, the lobes triangular; outer petals oblong, 9–11 mm. long, 2.5–3 mm. broad, densely sericeous on the back, the inner petals narrower; carpels (mature?) ellipsoid, about 2.5 cm. long, 1.4 cm. broad, glabrous.

Thickets, Baracoa, Oriente (*Roig 99*).

Family LAURACEAE

Persea Shaferi P. Wilson, sp. nov.

A slender shrub 2 m. high, with puberulent twigs. Leaves oblong-elliptic or oblong-obovate, 4.5–7.5 cm. long, 1.5–2.5 cm. broad, acutish or obtuse at the apex, acute at the base, glabrous above, the midvein impressed, the lateral veins puberulent and rather indistinctly reticulate-veined beneath; inflorescence 8 cm.

long, the branches puberulent; fruit (immature) subglobose, 9 mm. in diameter.

Type collected at Camp La Gloria, south of Sierra Moa, Oriente (*Shafer 8248*).

Family CAESALPINIACEAE

Cassia benitoensis Britton & Wilson, sp. nov.

Shrub 1–3 m. tall; young twigs, petioles and rachis pubescent with short, stiff, incurved hairs. Leaves 5–9 cm. long, glandular, the gland slender, 2 mm. high, situated between the leaflets of the lowest pair; petioles and rachis narrowly grooved; stipules lanceolate, 6–7 mm. long, acuminate; leaflets 5–6 pairs, oblong-elliptic or elliptic, 1.5–2.4 cm. long, 1–1.2 cm. broad, rounded and mucronulate at the apex, rounded and inequilateral at the base, the margins ciliate; pods flat, 14 cm. long, 8 mm. broad.

Along rocky stream, vicinity of Camp San Benito, Oriente (*Shafer 4072*).

Caesalpinia subglauca Britton, sp. nov.

An unarmed shrub, 2.5 m. high, the twigs glabrous. Leaves bipinnate; petiole rather stout, 1–1.5 cm. long; pinnae 5 or 7, the lower opposite or alternate, 5–10 cm. long, the rachis loosely pubescent; leaflets 9–15, sessile, coriaceous, glabrous, oblong-ovate to ovate-orbicular, 1–2.5 cm. long, 7–15 mm. wide, strongly reticulate-veined above, pale and subglaucous beneath, the apex rounded or emarginate, the base rounded or subcordate, oblique; fruiting pedicels stout, about 2 cm. long; pods flat, thin, puberulent, obliquely oblong, dehiscent, 3–5 cm. long, about 1.5 cm. wide, sharply beaked.

Hillside thicket, near Santiago, Oriente (*Britton & Cowell 12596*).

Caesalpinia myabensis Britton, sp. nov.

A shrub about 1.3 m. high, with slender gray branches, the young twigs densely short-pubescent. Leaves bipinnate, the petiole and rachis densely short-pubescent; petiole 1–1.5 cm. long; pinnae 5–7, opposite, 3–5 cm. long; leaflets 7–17, sessile, coriaceous, loosely pubescent, dark-green and shining above, pale, dull and pubescent on the midvein beneath, strongly pinnately veined, 6–12 mm. long; inflorescence racemose; fruiting pedicels erect, slender, pubescent, 2–2.5 cm. long; pods obliquely oblong, spreading, about 3 cm. long, 1–1.3 cm. wide, subulate-tipped, puberulent.

Dry hill, between Holguin and Myabe, Oriente (*Shafer 1403*).

Caesalpinia Hornei Britton, sp. nov.

A shrub with unarmed branches; the twigs, petioles and rachis pubescent with short incurved hairs. Leaves bipinnate; petioles rather slender, 1.5–1.7 cm. long; pinnae 5–7, opposite, 5.5–7.5 cm. long; leaflets 7–11, broadly oblong to somewhat oblong-ovate, 1.5–2.5 cm. long, and 0.9–1.5 cm. broad, rounded and emarginate at the apex, truncate and more or less inequilateral at the base, sessile, reticulate-veined on both surfaces, glabrous and somewhat lustrous above, paler and dull beneath; inflorescence racemose; flowering pedicels erect, slender, loosely pubescent, about 2 cm. long; corolla yellow, 2–2.4 cm. broad; petals obovate, 1–1.2 cm. long, 8–10 mm. broad.

Savanna, Ciego de Avila, Camaguey (*Horne 95*).

Family FABACEAE

Harpalyce macrocarpa Britton & Wilson, sp. nov.

A tree 4 m. high, or more, with slender, spreading branches, the twigs, petioles and rachis densely puberulent with ferruginous hairs. Leaves odd-pinnate, 10–14 cm. long, the petioles 1–2 cm. long; leaflets 11–15, oblong to oblong-elliptic, 2.2–3.8 cm. long, 1–1.5 cm. broad, rounded and emarginate at the apex, rounded and often subcordate at the base, short-petioled, coriaceous, glabrous and rather dull above, the veins slender and rather indistinct, finely reticulate-veined and glandular beneath, glabrous with the exception of the midvein; legume spatulate-oblanceolate, 5–6 cm. long, 1.5 cm. broad near the apex, more or less curved, glabrous.

Border of arroyo, palm barren, Santa Clara (*Britton & Cowell 13284*).

Harpalyce villosa Britton & Wilson, sp. nov.

A tree 3–4 m. high, with rather stout grayish branches, the twigs, petioles, rachis and under surface of the leaflets densely short-villous with ferruginous hairs when young. Leaves 6–7.5 cm. long, the petioles about 1.5 cm. long; leaflets oblong or elliptic-oblong, 2–2.7 cm. long, 0.6–1.2 cm. broad, rounded and emarginate at the apex, rounded at the base, short-petioluled, thick-coriaceous, dark-green, glabrous and shining above, paler, indistinctly veined and conspicuously impressed glandular beneath,

glabrescent in age with the exception of the midvein; legume oblong, 4 cm. long, 1–1.2 cm. broad, pointed at both ends; seeds ovate, 5 mm. long, 4–4.5 mm. broad.

Among rocks along stream, vicinity of Camp San Benito, Oriente (*Shafer 4089*); also collected at Moa, Baracoa (*Roig 43*).

BEMBICIDIUM Rydberg, gen. nov.

A low unarmed shrub. Leaves abruptly pinnate; stipules lanceolate, persistent; petiole and rachis broadly winged, the wings discontinuous, the rachis slightly produced above the uppermost leaflets; leaflets entire, coriaceous without veins, the midrib prominent beneath, obsolete above; stipels obsolete. Flowers solitary in the axils. Calyx turbinate, as broad as long, with two broad, subequal, acute lips; corolla purplish, with subequal petals. Banner obovate, slightly retuse, gradually tapering into the short broad claw. Wings and keel-petals equal in length and shape, the blades obliquely oblanceolate, rounded at the apex, slightly auricled at the base; claws short, straight, the blades of the keel-petals united at the middle only. Ovary slightly stipitate, linear, many-ovuled; style glabrous, bent inward at the base, slightly arcuate, not hooked at the apex; stigma minute, terminal. Fruit unknown. [Name Greek, a little top, from the small top-shaped flower buds.] A monotypic genus.

Bembicidium cubense Rydberg, sp. nov.

A shrub 5–6 dm. tall, the branches and twigs clothed with appressed, ferruginous hairs. Leaves equally pinnate, 0.7–2 cm. long, short-petioled, glabrous, the rachis prominently winged; leaflets 2–6, oblong to elliptic or somewhat obovate, rounded at the apex, often somewhat inequilaterally rounded at the base, sessile, dark-green, wrinkled and veinless above, brownish beneath, the midvein rather prominent, the lateral veins indistinct; margin revolute; corolla 1–3 cm. long; blade of the standard obovate; wings oblanceolate; keel-petals obanceolate, 1 cm. long.

Mountain woods, vicinity of Baracoa, Oriente (*Shafer 4284*).

Notodon cayensis Britton & Wilson, sp. nov.

A shrub 1–2 m. tall, with grayish-brown, puberulent branches, the young twigs pubescent with appressed, ferruginous hairs. Leaves equally pinnate, 1–1.5 cm. long, short-petioled, glabrous, the rachis narrowly winged; leaflets 2 or 4, obovate, 6–11 mm. long, 2–4 mm. broad above the middle, rounded at the apex,

cuneate at the base, sessile, green and with few inconspicuous veins or veinless above, whitish and veinless beneath, the margin strongly revolute; peduncles axillary, 4–5 mm. long, slender; calyx glabrous, broadly campanulate, 4- or 5-toothed; corolla "bluish"; blade of the standard rounded, obovate, retuse at the apex, 5 mm. broad; wings oblanceolate, with a small basal lobe; keel-petals oblanceolate, 1 cm. long; pod unknown.

Cayo Guajaba, Camaguey (*Shafer 658 and 2823*).

Notodon savannarum Britton & Wilson, sp. nov.

A shrub 0.5–2.5 m. high, the branches stiff, the young shoots finely pubescent. Stipules minute; leaves 1.5 cm. long or less, evenly pinnate, short-petioled, glabrous, the rachis winged between the 2–4 pairs of opposite, sessile leaflets and terminating in a short tip; leaflets coriaceous, obovate or oblong-obovate, 4–8 mm. long, rounded at the apex, obtuse at the base, dark green and veinless above, nearly white and rather strongly pinnately few-veined beneath; stipels none; peduncles axillary, solitary, slender, glabrous, 5–8 mm. long; calyx glabrous, broadly campanulate, subtruncate and minutely 5-toothed, about 2 mm. long; corolla rose-purple, about 1 cm. long; pods (immature) 2.5–4 cm. long, 3–4 mm. broad.

Rocky soil, savannas near Camaguey (*Britton & Cowell 13149.*)

CAÑIZARESIA Britton, gen. nov.

A shrub, with alternate, short-petioled, unevenly pinnate leaves, the small opposite leaflets coriaceous, the stipules obsolete, the flowers in short axillary racemes, the bracts early deciduous, the pedicels short. Calyx subcampanulate, its teeth short, obtuse, nearly equal, the two upper ones partly united. Standard broadly ovate, rounded at the apex, subtruncate at the base, short-clawed, unappendaged; wings oblong, long-clawed; keel long-clawed, arcuate, about as long as the wings, 2-lobed at the base. Stamens 10 (9 and 1); filaments filiform; anthers ovate, versatile. Ovary narrowly subcylindric, sessile, puberulent; style nearly as long as the ovary, curved near the base; stigma small, sub-capitate. Legume short-stipitate, indehiscent, linear, with four narrow subcoriaceous wings, more or less constricted between the nearly sessile ovate seeds. [In honor of Professor Felipe Garcia Cañizares.] A monotypic genus.

Canizaresia cubensis (Urban) Britton, comb. nov.

Piscidia cubensis Urban, Symb. Ant. 7: 229. 1912.

Barren rocky savannas, Oriente, Camaguey, Santa Clara. Endemic.

Bradburya lobata Britton & Wilson, sp. nov.

Stems twining, glabrous or sparingly pubescent with rather long, whitish hairs. Leaflets 3, hastate-ovate with rounded lobes, 4–9.5 cm. long, 2–9 cm. broad, abruptly short-acuminate or acute at the apex, subtruncate or somewhat rounded at the base, short-petioled, glabrous or sparingly pubescent on the veins; peduncles few-flowered; bracts lanceolate or lanceolate-ovate, several times longer than the calyx, acuminate at the apex; calyx puberulent, the lobes short; corolla purple; standard orbicular, 3.5 cm. high, 4.5 cm. wide, pilose on the back with appressed, ferruginous hairs; pods linear, 12–15 cm. long, 8 mm. wide; seeds 4–4.5 mm. long, 3 mm. wide, black.

Waste places, Vedado, Havana (*Léon & de Cubas 8507*).

Erythrina venosa Britton & Wilson, sp. nov.

A small tree, 6 m. high, with grayish or yellowish-gray glabrous twigs, which are often closely armed with rather stout, straight prickles 2–7 mm. long. Leaves 5–10 cm. long, the petioles slender, puberulent, 3–5 cm. long; leaflets 3, ovate to broadly ovate, 2–4.5 cm. long, 1.5–3.5 cm. broad, obtuse or occasionally rounded at the apex, often obliquely rounded at the base, glabrous and finely reticulate-veined above, coarsely reticulate-vined beneath, the veins loosely pilose; short-petioluled; flowers immature; calyx broadly campanulate, puberulent; standard oval, 2 cm. long, 1.2 cm. broad, dark red; keel-petals obovate or obliquely obovate, 6–7 mm. long, 2.5–3 mm. broad, free, the wings obovate or obliquely obovate.

La Perla, Oriente (*Shafer 8540*).

Phaseolus savannarum Britton & Wilson, sp. nov.

Stems pubescent with more or less reflexed hairs, erect or ascending from a perennial rootstock, the peduncles elongate, much exceeding the leaves. Leaflets oblong-linear to oblong-ovate, 1–4 cm. long, 0.3–1 cm. broad, acute or occasionally rounded at the apex, rounded at the base, papillose and more or less densely pubescent above with mostly appressed hairs, appressed-pubescent beneath, coriaceous, the margin ciliate; racemes simple; flowers short-pedicelled; calyx campanulate, 2–3 cm. long, appressed-puberulent, the lobes triangular to triangular-

ovate; corolla pink; wings 2–2.5 cm. long, the standard 1–1.5 cm. broad; legume linear, 4–6 cm. long, 3 mm. broad, appressed-puberulent; seeds 2.5 mm. long, 1.5 mm. broad.

Savannas, pine lands and palm barrens, Camaguey, Santa Clara, Matanzas, Pinar del Rio and Isle of Pines. Type from Herradura, Pinar del Rio (*Earle 632*).

Family ERYTHROXYLACEAE

Erythroxylon Roigii Britton & Wilson, sp. nov.

A glabrous shrub, 2–2.5 m. high, with slender twigs. Leaves elliptic, 5–7 cm. long, 2–3.5 cm. wide, obtuse and short-apiculate at the apex, acute at the base, sub-coriaceous, greenish-brown, lustrous and rather obscurely reticulate-veined above, rusty-brown and reticulate-veined beneath; petioles slender, 7 mm. long; drupes ellipsoid, 11–13 mm. long, 4.5–5 mm. thick.

Type collected at Caleta Grande, Isle of Pines (*Roig & Cremata 1856*).

Erythroxylon coriaceum Britton & Wilson, sp. nov.

A small tree, 5–7 m. high, with rather stiff gray branches. Leaves elliptic-obovate to obovate, 2.5–5.5 cm. long, 1.5–3.4 cm. broad, rounded and often emarginate at the apex, obtuse or somewhat acute at the base, coriaceous, indistinctly veined, dark green above, paler beneath, the margin revolute; petioles 5–7 mm. long; stipules triangular, 2–3 mm. long; buds several together in the axils, on short pedicels; calyx-lobes ovate, acute; drupes (undeveloped?) narrowly oblong, about 1 cm. long, orange-red.

Type collected on bank of Rio Guayabo, above the falls, Oriente (*Shafer 3601*).

Family BURSERACEAE

Elaphrium Shaferi Britton & Wilson, sp. nov.

A glabrous tree 6 m. in height; bark of the trunk reddish-brown, easily peeling off in thin sheets; branches brown; leaves simple, narrowly deltoid-lanceolate, 4–8 cm. long, 1–1.8 mm. broad at the base, acuminate at the apex, rounded and cordate at the base, reticulate-veined above, the lateral veins nearly at right angles to the midvein; reticulate-veined beneath; petioles slender, 1–1.5 cm. long; inflorescence about 1–1.5 cm. long; drupes obovoid, 6.5–7 mm. long, 5 mm. broad.

In dry rocky places, La Guira, north of Sumidero, Pinar del Rio (*Shafer 13751*).

Family MALPIGHIACEAE

Bunchosia Leonis Britton & Wilson, sp. nov.

Shrub 1 m. tall, with grayish-brown twigs. Leaves obovate, 1–3.2 cm. long, rounded and emarginate at the apex, cuneate at the base, coriaceous, lustrous above, dull beneath, glabrous in age, short-petioled; flowering pedicels pubescent; corolla about 1–1.3 cm. broad; sepals ovate, 2.5 mm. long, ciliate, the glands one-half the length of the sepal body; larger petals 5–5.5 mm. long, the blades suborbicular, toothed; ovary and style glabrous; drupes 1.6–2 cm. long.

Type collected in coastal thicket, Playa del Chivo, Havana (*Léon 7214*).

Family EUPHORBIACEAE

Andrachne (?) **cuneifolia** Britton, sp. nov.

A glabrous shrub 1–2 m. high, with slender elongated leafy branches. Leaves obovate, cuneate, 5–12 mm. long, rounded at the apex, delicately pinnately veined, dark green and shining above, pale green and dull beneath, the petiole about 1 mm. long; stipules minute; fruiting pedicels about 14 mm. long, the six persistent oblong sepals about 1 mm. long.

Punta Maisi, Oriente: southern and southwestern Porto Rico. Type from a dry hillside, Coamo Springs, Porto Rico (*Underwood & Griggs 545*).

RAMSDENIA Britton, gen. nov.

Monoecious shrubs, with flattened branches, distichous, emarginate, orbicular or obovate leaves, or those of primary branches reduced to scales, the apetalous flowers solitary or 2 together in the axils, the pistillate few. Sepals 5, coriaceous. Stamens 5, the filaments connate, the anthers extrorse. Styles several-cleft. [In honor of Charles T. Ramsden, distinguished Cuban zoologist.]

Type species: *Phyllanthus excisus* Urban.

Ramsdenia excisa (Urban) Britton, comb. nov.

Phyllanthus excisus Urban, Repertorium 13: 449. 1914.

In rich woods, Navas to Camp Buena Vista, Oriente. Endemic. A shrub about 3 m. high.

Ramsdenia incrustata (Urban) Britton, comb. nov.

Phyllanthus incrustatus Urban, Repertorium 13: 449. 1914.

Moist woods, mountains of northern Oriente. Endemic.

Orbicularia scopulorum Britton, sp. nov.

A shrub, 2 m. high, with slender, ascending branches and very slender leafy twigs; stipules setaceous, deflexed, 3–4 mm. long; leaves spatulate-obovate, 5–7 mm. long, nearly sessile, distichous, minutely foveolate and inconspicuously veined above, distinctly pinnately veined beneath, rounded at the apex, cuneate at the base; flowers and fruit unknown.

Rocky thickets near Camp Toa, Oriente, at about 400 m. altitude (*Shafer 4006*).

Orbicularia foveolata Britton, sp. nov.

A vine-like shrub, with short, ascending branches, the twigs very slender. Stipules subsetaceous, about 1 mm. long. Leaves coriaceous, orbicular-obovate or elliptic-orbicular, nearly sessile, 8–12 mm. long, shining, inconspicuously veined and distinctly foveolate above, dull, and prominently veined beneath, rounded at the apex, obtuse at the base; flowers and fruit unknown.

Camp La Gloria, south of Sierra Moa, Oriente (*Shafer 8271*).

ROIGIA Britton, gen. nov.

A shrub with dimorphous branches, the narrowly spatulate, entire leaves spirally arranged on the short secondary branches, the staminate flowers long-peduncled, solitary in the axils. Staminate flowers with a 6-parted calyx, the segments obovate, rounded, erose; stamens 10, the filaments united into a long column, free above; anthers suborbicular. [In honor of Juan T. Roig, enthusiastic Cuban botanist.] A monotypic genus.

Roigia comosa (Urban) Britton, comb. nov.

Phyllanthus comosus Urban, Repertorium 13: 451. 1914.

Dry rocky soil, serpentine hills near mouth of Rio Yamaniguey, Oriente. Endemic.

Conami (?) **ovalifolia** Britton, sp. nov.

A glabrous undershrub, 1 m. high or less, the stem rather stout, the branches mostly simple, elongated, slender, compressed

and somewhat angled. Leaves chartaceous, distichous, oval to elliptic, 4–8 cm. long, 2–4 cm. wide, rounded at the apex, obtuse or narrowed at the base, pinnately veined; stipules clustered at the end of the stem, lanceolate, acuminate, striate, 1–1.5 cm. long; flowers fascicled in the axils, reddish, the slender pedicels 3–6 mm. long; perianth-segments 4, those of pistillate flowers suborbicular, rounded, about 4 mm. long, larger than the staminate; styles united; stigmas 3, short, spreading; filaments united; anthers 2.

Valleys, northern Oriente: type collected between Yamuri Arriba and Bermejal (*Shafer 8446*).

DIMORPHOCLADIUM Britton, gen. nov.

A shrub, with dimorphous branches and leaves. Primary branches stout, terete, their leaves oblong-spatulate, densely arranged spirally. Secondary branches very slender, compressed, their small oblong-obovate leaves distichous. Staminate flowers pedicelled, clustered in the axils; sepals 5, ovate. Stamens 4, the filaments connate, the anthers free, subquadrate. [Greek, dimorphous branches.] A monotypic genus.

Dimorphocladium formosum (Urban) Britton, comb. nov.

Phyllanthus formosus Urban, Repertorium **13**: 451. 1914.

Thickets between Camp La Barga and Camp San Benito, Oriente. Endemic. A shrub 4–6 dm. high, the flowers pink.

Phyllanthus Selbyi Britton & Wilson, sp. nov.

A glabrous, perennial herb, 4 dm. tall, with ascending, slightly flexuose, woody branches; the slender leafy twigs 1.5–3 cm. long. Leaves elliptic to oval, 2–2.5 mm. long, 1.3–1.6 mm. broad, obtuse at the apex, rounded or somewhat truncate at the base, short-petioled, coriaceous, veinless or nearly so; stipules linear-lanceolate, 1 mm. long; flowers monoecious; pistillate flowers short-pedicelled, the sepals obovate, 1.3–1.5 mm. long, 0.5 mm. broad; ovary depressed-globose; styles 3, forked near the top; staminate flowers short-pedicelled, the sepals broadly ovate, 1.2 mm. long, 0.9–1 mm. broad; filaments united with a short column; anthers 3; capsule depressed-globose, about 1.8 mm. broad; seeds brown, about 1 mm. long, transversely striate.

White sand, vicinity of San Pedro, Isle of Pines (***Britton, Wilson & Selby 14157***).

Phyllanthus dimorphus Britton & Wilson, sp. nov.

A glabrous perennial herb, 5–6 dm. tall, with slender woody stems branching mostly near the apex, the slender branches straight, ascending or spreading, 8–14 cm. long. Leaves oblong or elliptic-oblong, 5–9 mm. long, 2–2.5 mm. broad, short-petioled, rounded or occasionally somewhat acutish at the apex, rounded at the base, dark-green above, paler beneath; stipules narrowly lanceolate, 1–1.5 mm. long, purplish-black; flowers dioecious; pistillate flowers slender-pedicelled, their sepals obovate to broadly obovate, 2 mm. long, 1–1.5 mm. broad, rounded at the apex; styles of flowers of some plants 3, slender, forked above the middle; of other plants united into a column about 1 mm. long, the stigma orbicular, peltate, entire; staminate flowers not seen.

Grassy hill between El Porvenir and Aguacate, Trinidad mountains, Santa Clara, 700–900 m. altitude (*Britton & Wilson 5350*).

Croton cueroensis Britton & Wilson, sp. nov.

Shrub 2 m. tall; the twigs and petioles densely ferruginous-hispid with stellate hairs when young, grayish in age. Leaves broadly ovate to suborbicular, 1.8–3.4 cm. long, 1.5–2.8 cm. broad, more or less soft pubescent above with stellate hairs, stellate-canescent beneath; petioles 0.8–1.5 cm. long; stipules subulate, broadening at the base, 7–11.5 mm. long; buds subglobose, flattened; sepals of the staminate flowers ovate; filaments tomentose; capsule densely stellate-tomentose; seed short-ovoid, 3.5 mm. long, 3 mm. broad, grayish.

Vicinity of El Cuero, Oriente (*Britton & Cowell 12735*).

Differing from *C. spiralis* Muell. Arg. in the long, subulate stipule which is not coiled at the base, also by the stellate hairs of the upper surface, which are long-rayed.

Argythamnia cubensis Britton & Wilson, sp. nov.

A small shrub with brownish or purplish-brown decumbent branches; leaves elliptic to oval or obovate, 1–2.5 cm. long, 0.5–1.4 cm. broad, rounded or acute at the apex, acute at the base, entire or crenulate, short-petioled, purplish-brown and more or less strigillose on both surfaces; staminate flowers about 2 mm. broad; sepals 5, lanceolate, 1–1.2 mm. long, 0.5 mm. broad; petals 5, ovate, 1–1.1 mm. long, 0.5–0.6 mm. broad; stamens 5, the filaments distinct; sepals of the pistillate flowers 5, ovate, acuminate at the apex; styles 3, distinct, bifid; capsule about 3 mm. in diameter; seeds subglobose, 1.1–1.2 mm. broad, reticulated.

Rocky coastal hills, vicinity of El Morro, Santiago Bay, Oriente (*Britton & Cowell 12580*).

Lasiocroton gracilis Britton & Wilson, sp. nov.

Shrub, the young twigs clothed with minute, ferruginous, stellate hairs; leaves ovate, 3–3.5 cm. long, 1.4–2.5 cm. broad, acute to short-acuminate at the apex, rounded or subcordate at the base, short-petioled, those on the branches oblong-elliptic, 1–1.5 cm. long, 0.5 cm. broad, all entire and glabrous or nearly so above, beneath reticulate-veined and densely stellate-pubescent with whitish hairs; inflorescence slender, 3–5 cm. long, loosely flowered; petals of the staminate flowers ovate-lanceolate, 2 mm. long, 1 mm. broad, acute at the apex, densely pubescent on the back; fruit not seen.

Type collected in the vicinity of Santiago, Oriente (*Pollard & Palmer 281*).

Lasiocroton (?) **cordifolius** Britton & Wilson, sp. nov.

A shrub 2–2.5 m. tall, the young twigs densely clothed with short, ferruginous, stellate hairs; leaves broadly ovate-oval to oval, 7–14 cm. long, 4.5–10.5 cm. broad, obtuse, acute or short-acuminate at the apex, rounded and cordate at the base, entire, above glabrous; the veins rather inconspicuous, beneath stellate-pubescent with whitish hairs, the midvein and lateral veins prominent; petioles 4–5.5 cm. long, densely short-stellate pubescent; flowers and fruit not seen.

Along stream in the Pinales southeast of Paso Estancia, Oriente (*Shafer 1724*).

Pera longipes Britton & Wilson, sp. nov.

A shrub about 3 m. high, with slender, ascending, glabrous twigs. Leaves alternate, obovate, coriaceous, 3–7 cm. long, 1–3 cm. wide, green on both sides, elepidote, rounded or emarginate at the apex, cuneate at the base, faintly pinnately few-veined, the stout petiole 1.5–2.5 mm. long; staminate inflorescence long-peduncled, subglobose, 1-bracted, about 4 mm. in diameter, sparingly lepidote; peduncle weak, curved or flexuous, 1.5–2 cm. long; bract ovate-orbicular, rounded, lepidote, 1.5 mm. long.

Dry serpentine thickets, between Navas and Camp Buena Vista, Oriente, at 650 meters altitude (*Shafer 4416*).

Pera pallidifolia Britton & Wilson, sp. nov.

A shrub, 2–2.6 m. high, with slender, ascending twigs. Leaves alternate, oblong-oblanceolate, subcoriaceous, 4–8 cm.

long, 1–2.2 cm. wide, pale green on both sides, pinnately few-veined, elepidote, obtuse or rounded at the apex, narrowed at the base, the rather slender petioles 5–10 mm. long; peduncles of the staminate inflorescence straight, lepidote, 6–8 mm. long; staminate involucre 1-bracted or with a second minute bract, rather densely lepidote, depressed-globose, about 2 mm. in diameter.

Dry hillsides between Rio Yamaniguey and Camp Toa, Oriente, at 400 meters altitude (*Shafer 4183*).

Sapium cubense Britton & Wilson, sp. nov.

A glabrous milky shub or a small tree up to 6 m. high, the slender twigs subterete. Leaves subcoriaceous, oblong to oblong-obovate, 8 cm. long or less, 1.5–3 cm. wide, acute or obtuse at the apex, narrowed or subcuneate at the base, glandular-crenulate, the midvein prominent, the lateral venation obscure, the slender, eglandular petiole 8–15 mm. long; spikes slender, interrupted, axillary, about as long as the leaves or shorter; calyx about 1 mm. long; filaments 2–3 times as long as the calyx; valves of the capsule about 7 mm. long.

Woods and thickets, northern Oriente. Type from near Woodfred, Sierra Nipe (*Shafer 3607*).

Acalypha Hutchinsonii Britton, sp. nov.

Perennial, apparently dioecious, depressed, velvety-pubescent, branched, the branches slender, prostrate or ascending, 4–8 cm. long. Leaves ovate-orbicular, 5–15 mm. long, crenate-serrate, obtuse or acutish at the apex, subtruncate at the base, the petioles 1–3 mm. long; staminate spike short-peduncled, 6–9 mm. long.

Rocks on the coast of southern Santa Clara (*Britton, Earle & Wilson 5907*).

The species appears to be distinct from any of those described by Prain and Hutchinson in Kew Bulletin **1913**: 1–28.

Family CYRILLACEAE

Cyrilla cubensis P. Wilson, sp. nov.

A glabrous shrub 1–2 m. tall, with grayish more or less angled twigs. Leaves elliptic-obovate, 1.5–3 cm. long, 0.9–2 cm. broad, rigidly coriaceous, rounded and emarginate at the apex, acute or rounded at the base, dark green and shining above, the veins rather inconspicuous, paler, papillose and reticulate-veined be-

neath; midrib impressed above, prominent beneath; racemes stout, 3.5–4 cm. long, many-flowered, erect, glabrous; bracts narrowly lanceolate, 1.5 mm. long; pedicels 2.5–3 mm. long; calyx-lobes ovate-lanceolate, short-acuminate; petals elliptic or elliptic-ovate, 3–3.2 mm. long, 1.2 mm. broad, acute; stamens about half as long as the petals; ovary glabrous.

Mountains of Oriente (*Shafer 4140, type; 4109, 4060*).

Family ILICACEAE

Ilex Shaferi Britton & Wilson, sp. nov.

A small shrub, 1–3 m. high, with grayish branches and puberulent twigs. Leaves obovate, 0.6–1.4 cm. long, 0.5–0.8 cm. broad, with entire revolute margins, rounded and often emarginate at the apex, cuneate at the base, short-petioled, glabrous, shining and obscurely veined above, paler, lustrous and obscurely veined beneath; fruit subglobose, solitary in the axils of the leaves, 6–7 mm. long, 5–7 mm. in diameter, dark red.

Mountains of Oriente (*Shafer 8041, type; 4065 and 4126*).

Ilex Clementis Britton & Wilson, sp. nov.

A shrub several meters high. Leaves elliptic to ovate-oval or somewhat obovate, 4.5–9 cm. long, 2.5–5 cm. broad, rounded or acutish and usually apiculate at the apex, cuneate or rounded at the base, entire, glabrous, dull above, the midvein impressed, reticulate-veined and paler beneath; pedicels minutely puberulent, 3–5 mm. long; staminate flowers fascicled in the axils of the leaves; sepals 4, suborbicular, 1.5–2 mm. broad, strongly imbricate, ciliate; corolla lobes 4, elliptic to oval, 2–2.2 mm. long; fruit unknown.

Mountains of Santa Clara (*Brothers Léon and Clement 6645, type; 6558, 6669 and 6694*).

Family HIPPOCRATEACEAE

Salacia (?) **nipensis** Britton, sp. nov.

A woody vine, sometimes 3 m. long, the twigs warty. Leaves coriaceous, glabrous, entire, elongate-lanceolate, 6–18 cm. long, 1.5–4 cm. wide, obtuse at the apex, cordate at the base, pinnately veined, the midvein prominent, the lateral venation obscure; petioles stout, only 2 mm. long; fruit oblong, obtuse, slightly narrowed towards the base, about 4 cm. long and 1.5 cm. in diameter, scurfy; sepals persistent, suborbicular, about 3 mm. broad.

Dry, rocky hillside, Sierra Nipe, Piedra Gorda to Woodfred, Oriente (*Shafer 3183*).

Family RHAMNACEAE

Sarcomphalus cubensis Britton, sp. nov.

A glabrous tree about 10 m. high, the twigs rather stout, stiff, somewhat angled. Leaves borne on short spurs, elliptic or obovate-elliptic, slightly fleshy, 1.5–3.5 cm. long, rounded or emarginate at the apex, obtuse or somewhat narrowed at the base, faintly pinnately veined with the lower pair of veins the strongest, the midvein rather prominent beneath, the slender petioles 3–5 mm. long; fruiting pedicels very slender, 8–12 mm. long; fruit ovoid, 6–8 mm. long, short-tipped, about 3 times as long as the calyx.

Coastal thickets, Oriente, Santa Clara. Type from Punta Piedra, Nipe Bay, Oriente (*Britton & Cowell 12486*).

Rhamnidium (?) **oblongifolium** Britton & Wilson, sp. nov.

A shrub 1 m. tall, with puberulent twigs; leaves oblong, occasionally somewhat elliptic-oblong, 0.9–2.5 cm. long, 3–6 mm. broad, rounded and emarginate at the apex, obtuse at the base, entire, green and lustrous above, whitish and conspicuously black-dotted beneath, glabrous; petioles 1–2.5 mm. long, puberulent; flower-clusters axillary, long-peduncled; sepals triangular-ovate, acuminate, glabrous, glandular-dotted; petals broadly triangular-obovate; filaments subulate; anthers ovate; ovary ovoid, glabrous, black-dotted.

Rocky hill, palm barren, Santa Clara (*Britton & Cowell 13311*).

Rhamnidium (?) **orbiculatum** Britton & Wilson, sp. nov.

An erect shrub, 2 m. tall, with grayish-brown, glabrous twigs; leaves oval to orbicular-oval, 1.5–2.5 cm. long, 1.5–2.4 cm. broad, rounded and emarginate at the apex, rounded at the base, lustrous, reticulate-veined and black-dotted above, paler, black-dotted and dull beneath, glabrous; petioles 5–6 mm. long; flower-clusters axillary, long-peduncled; sepals ovate, glabrous, black-dotted; petals present; filaments short, anthers ovate.

Dry soil, savannas near Camaguey (*Britton & Cowell 13188*).

Rhamnidium Rocanum Britton & Wilson, sp. nov.

A shrub with slender grayish-brown puberulent twigs. Leaves oblong-elliptic, 7–10 cm. long, 2.4–3.5 cm. broad, rounded or occa-

sionally acutish and mucronulate at the apex, rounded at the base, entire, glabrous, reticulate-veined and tuberculate above, sparingly puberulent and conspicuously black-dotted beneath; petioles 6–8 mm. long; flower-clusters axillary, on peduncles about 1 cm. long; flowers immature; sepals triangular-ovate, acute, glandular-dotted; petals orbicular-obovate; filaments subulate, glabrous; anthers ovate; ovary ovoid, compressed, glabrous, glandular-dotted.

In woods, Banao Mountains, Santa Clara (*Léon & Roca 8052*).

Family VITACEAE

Cissus Torreana Britton & Wilson, sp. nov.

A vine several meters long, with loosely hirsute, winged branches; leaves 3-foliolate; petioles 8–10 cm. long, winged; leaflets membranaceous, elliptic-ovate to obliquely ovate, 8–11 cm. long, 5–7 cm. broad, acuminate at the apex, obliquely rounded or acutish at the base, puberulent above, loosely hirsute on the veins beneath, the margin serrulate; petiolules about 1.5 cm. long, hirsute; flowers and fruit not seen.

Type from Sierra del Grillo, Madruga, Havana (*Léon & de la Torre 6345*).

Family MALVACEAE

Malache calcicola Britton, sp. nov.

A shrub, 2 m. high, the twigs, petioles and leaf-surfaces densely puberulent and bearing scattered, large stellate hairs. Leaves ovate-orbicular, 1–3 cm. long, irregularly dentate and mostly 3-lobed, acute or acuminate at the apex, cordate at the base, green above, nearly white beneath; the petioles shorter than the blades; flowers solitary, slender-peduncled, the peduncles jointed somewhat below the calyx; bractlets 5, linear, puberulent, appressed, a little shorter than the calyx; calyx puberulent and stellate-pubescent 5-lobed, 6–7 mm. long, its lobes ovate, acute; petals red, strongly veined, about twice as long as the calyx; stamen-column about twice as long as the petals; style-branches 10, slender, 2 cm. long; carpels 5, dry coriaceous, irregularly rugose-crested on the sides, sharply and narrowly winged on the back, short-beaked, 6 mm. long, 1-seeded, dehiscent; seed obliquely ovoid, brown, shining, smooth, 3 mm. long.

Base of cliff, Rio San Juan, Santa Clara (*Britton, Earle & Wilson 5905.*)

Maga cubensis Britton & Wilson, sp. nov.

A tree, up to 15 m. high, the stout twigs densely and finely lepidote. Leaves ovate-orbicular, deeply cordate, acute or acuminate, coriaceous, entire, 6–12 cm. long, strongly palmately 5–7-veined, the veins enlarged and united at the base beneath, dull and finely reticulate-veined above, densely and finely lepidote beneath, the terete, lepidote petioles 10 cm. long or less; flowers solitary or clustered, on stout, lepidote peduncles 1–6 cm. long; calyx subcampanulate, lepidote, about 12 mm. long, nearly truncate, with 5 subulate teeth, circumscissile at the base and wholly deciduous; petals brown-yellow, rounded, finely many-veined, about 3 mm. long, densely lepidote without; stamen-column about twice as long as the petals; stamens yellow.

Coastal thickets, and low woodlands, Camaguey; Santa Clara. Type from Punta Diablo, Cienfuegos Bay, Santa Clara (*Britton & Wilson 6045*).

Family STERCULIACEAE

Melochia savannarum Britton, sp. nov.

A low, more or less prostrate undershrub, the young branches finely stellate-pubescent, often with simple hairs intermixed; leaves ovate to broadly oval, 1–2 cm. long, 0.7–2 cm. broad, acute or rounded at the apex, truncate, rounded or cordate at the base, rather coarsely serrate, glabrous or loosely pubescent above with simple and stellate hairs, more or less pubescent beneath; petioles 3–5 mm. long; flowers short-pedicelled; calyx-teeth triangular-subulate; petals narrowly obovate, 6.5–7 mm. long, 1.5–2 mm. broad; ovary tomentose.

Savannas and along streams, Pinar del Rio. Type from Herradura, Pinar del Rio (*Earle 639*).

Recorded by Grisebach as *M. melissifolia* Benth. and referred by Wright to *M. hirsuta* Cav.

Melochia nipensis Britton, sp. nov.

Perennial; herbaceous with a deep slender tap-root, branches ascending or spreading, very slender, villous and tomentose, 2.5 dm. long or less. Leaves oval or oblong, 6–16 mm. long, 4–7 mm. wide, tomentose on both sides, obtuse at the apex, somewhat narrowed at the base, serrulate, the villous petioles 2.5 mm. long or less; flowers few, glomerate; bracts narrowly linear; calyx about 3 mm. long, its lance-subulate teeth about as long as the tube; petals spatulate, yellow, 3 mm. long.

Pinelands, Sierra Nipe, near Woodfred, Oriente (*Shafer 3294*).

Family OCHNACEAE

Ouratea affinis Britton, sp. nov.

A tree 3–5 m. high, the twigs slender, gray. Leaves coriaceous, lanceolate or oblong-lanceolate, 4–7 cm. long, 2 cm. wide or less, entire, acuminate at the apex, obtuse or narrowed at the base, dull, faintly and closely pinnately straite-nerved, the midvein rather prominent; petioles 3–6 mm. long; fruiting pedicels 2–6 mm. long; receptacle subglobose, 5–6 mm. in diameter.

Mountains of northern Oriente. Type from Rio Naranja at 450–550 m. altitude (*Shafer 3869*).

Ouratea Roigii Britton, sp. nov.

Twigs gray, slender. Leaves lanceolate, chartaceous, dull, 4–7 cm. long, 1.5–2.5 cm. wide, acuminate at the apex, narrowed or rounded at the base, pinnately veined and reticulated, the venation rather prominent beneath, the petioles 4–8 mm. long; fruiting pedicels 2–4 cm. long; receptacle subglobose, about 6 mm. in diameter.

Canete, Baracoa, Oriente (*Roig 67*).

Family MARCGRAVIACEAE

Marcgravia calcicola Britton, sp. nov.

Barren climbing branches very slender, 3 dm. long or longer, their leaves sessile, ovate, cordate, acute, about 2 cm. long. Flowering branches slender, gray, their leaves oblong, 5–6 cm. long, 12–20 mm. wide, acute at both ends, the midvein prominent beneath, impressed above, the lateral venation wholly obscure, the petioles 1–2 mm. long, uppermost leaves ovate, 2–3 cm. long; raceme short, several–many-flowered; pedicels rather stout, thickened upward, 1–1.5 cm. long; sepals suborbicular, rounded; corolla-bud rounded; sterile pedicels incurved, 1 cm. long or less; bracts galeate, compressed, 6 mm. broad.

Limestone cliffs, Baños San Vicente, Pinar del Rio (*Britton & Gager 7412*).

Family THEACEAE

Haemocharis benitoensis Britton & Wilson, sp. nov.

A straggling shrub, 1–2 m. high, with slender branches, the twigs pilose with appressed hairs; leaves obovate, 3–5 cm. long,

1–1.6 cm. broad, rounded at the apex, cuneate at the base, yellowish-green and glabrous above, the midvein impressed, paler and often loosely pilose beneath, the midvein prominent, the lateral veins indistinct; margin more or less revolute; petioles slender, 5–7 mm. long, pilose; sepals suborbicular, 3 mm. long, appressed-pilose on the back; petals elliptic-obovate or obovate, 1 cm. long, 5–6 mm. broad, "white"; ovary appressed-pilose.

Type from thicket, vicinity of Camp San Benito, Oriente (*Shafer 4063*).

Family CLUSIACEAE

Rheedia brevipes Britton, sp. nov.

A tree about 4 m. high, the twigs short; leaves opposite, borne in 2–4 pairs near the ends of the twigs, rigid, oblong-lanceolate to ovate-lanceolate, 4–6 cm. long, 1–2.5 cm. wide, pinnately veined, acuminate, spinulose-tipped, narrowed or obtuse at the base, the stout petiole about 3 mm. long; staminate flowers solitary or few together on pedicels 3 mm. long; flower-bud subglobose, 2.5–3 mm. in diameter; sepals suborbicular, rounded.

Bank of arroyo, between Santa Clara and Manicaragua, Santa Clara (*Britton & Cowell 10262*).

Clusia callosa Britton & Wilson, sp. nov.

A glabrous shrub, 2–3 m. tall, with rather thick, more or less angled, grayish, branches; leaves broadly obovate, 4–6.5 cm. long, 2.7–4.5 cm. broad, rigid-coriaceous, rounded at the apex, obtuse at the base, lustrous above, the veins rather indistinct, paler beneath and conspicuously black glandular-dotted, the midvein prominent, vanishing at or above the middle, the lateral veins obscure or indistinct, the margin revolute and conspicuously thickened; inflorescence terminal, 6–7 cm. long; stigmas 5; fruit subglobose or globose-obovoid, 1.5 cm. long, 1.2–1.5 cm. broad.

Type from Camp La Gloria, south of Sierra Moa, Oriente (*Shafer 8206*).

Family HYPERICACEAE

Hypericum ophiticola Britton, sp. nov.

Perennial by a deep slender root, much branched, the stems angular, slender, prostrate or ascending, 5–15 cm. long, the branches short, ascending or erect, rather densely leafy. Leaves oblanceolate, 2–2.5 mm. long, sessile, rounded at the apex, nar-

rowed at the base, 1-nerved, black-punctate; flowers terminal, solitary, short-peduncled; sepals obovate-oblong, apiculate, 1-nerved, 2.5 mm. long; capsule oblong, 3-valved, about as long as the sepals.

Hillside, serpentine palm barren, Santa Clara (*Britton & Wilson 6140*).

Family FLACOURTIACEAE

Myroxylon (?) **rhombifolium** Britton & Wilson, sp. nov.

A shrub about 1 m. high, with very slender, elongated, puberulent branches, each node with an acicular spine 8–12 mm. long, Leaves coriaceous, rhombic, 6–10 mm. broad, about as long as wide, 2–5-toothed, strongly veined on both sides, the venation somewhat reticulated, dark green and shining above, pale green beneath, glabrous, the petioles 0.5–1 mm. long; flowers and fruit unknown.

Coe's Camp, Ensenada de Siguanea, Isle of Pines (*Britton & Wilson 14880*).

Lunania subcoriacea Britton & Wilson, sp. nov.

A shrub, about 3 m. high, with slender gray terete branches. Leaves oblong-lanceolate, subcoriaceous, glabrous, 12–17 cm. long, 4–5 cm. wide, acute or short-acuminate at the apex, obtuse or rounded at the base, the rather stout petioles 1–1.5 cm. long; raceme peduncled, about 10 cm. long, glabrous; pedicels 4.5–5 mm. long, jointed near the base, glabrous; sepals orbicular or suborbicular, 4.5 mm. broad, concave; filaments subulate; disk fleshy; ovary ovoid.

Rich woods, alluvial valley of Rio Yamaniguey, Oriente (*Shafer 4204*).

Lunania elongata Britton & Wilson, sp. nov.

Branches slender, elongated, puberulent when young, gray, terete. Leaves lanceolate or oblong-lanceolate, membranous, glabrous, 5–15 cm. long, 3 cm. wide or less, acuminate at the apex, rounded or subcordate at the base, the slender petioles 8–20 mm. long, puberulent when young; raceme long-peduncled, narrow, puberulent, many-flowered, 10–18 cm. long; pedicels 2–3 mm. long, jointed above the base, puberulent; sepals orbicular, 4 mm. broad, concave; stamens about 10; disk fleshy; ovary elliptic-ovoid.

Sierra de las Divisiones, Sancti Spiritus mountains, Santa Clara (*Léon and Clement 6598*).

Family THYMELAEACEAE

Daphnopsis oblongifolia Britton & Wilson, sp. nov.

A shrub 1–2 m. or more high, with slender branches, the young growth appressed-puberulent. Leaves linear-oblong to oblong or somewhat elliptic-oblong, 2–5.5 cm. long, 4–7 mm. broad, obtuse or acutish at the apex, acute at the base, short-petioled, entire, revolute-margined, the veins anastomosing and nearly parallel to the midrib; inflorescence short-peduncled, few-flowered; pedicels 2–2.5 mm. long, staminate flowers with calyx-tube short, the lobes ovate.

Type from palm barren, Santa Clara (*Britton & Cowell 13301*).

Family MYRTACEAE

Psidium nummularioides Britton & Wilson, sp. nov.

A small tree, with slender, gray, terete, glabrous twigs. Leaves orbicular or ovate, coriaceous, glabrous, 8–15 mm. long, rounded or obtuse at the apex, rounded or subcordate at the base, bright green and finely reticulate-veined on both surfaces, the midvein rather prominent, the stout petioles about 1 mm. long; pedicels axillary, solitary, slender, ascending, 1.5 cm. long; calyx-lobes suborbicular, 2–2.5 mm. long, 3–3.5 mm. broad, glabrous; young fruit ellipsoid, 8 mm. long, 5–6 mm. in diameter.

Coral limestone bench, Guantanamo Bay, Oriente (*Britton 2046*).

Psidium (?) **navasense** Britton & Wilson, sp. nov.

A glabrous shrub, about 1.3 m. high, the slender twigs terete. Leaves oblong-lanceolate or ovate-lanceolate, subcoriaceous, 5–7 cm. long, dull, bluntly acuminate at the apex, obtuse at the base, rather strongly pinnately veined with the veins united near the margin, the midvein impressed above, prominent beneath, the stout petioles about 2 mm. long; young fruits axillary, solitary, subglobose, about 7 mm. in diameter, on peduncles 6–8 mm. long; calyx-lobes suborbicular, 2 mm. long, 2–2.5 mm. broad; berry subglobose, 6 mm. in diameter.

Moist woods between Navas and Camp Buena Vista, Oriente, 650 m. altitude (*Shafer 4444*).

Psidium bullatum Britton & Wilson, sp. nov.

A shrub or a tree up to 5 m. high, the young twigs densely short-pubescent, terete. Leaves ovate or ovate-elliptic, 3–5 cm.

long, mostly obtuse at the apex, rounded or subcordate at the base, revolute-margined, very short-petioled, when young thin, densely puberulent above, white-tomentulose and black-dotted beneath, when old coriaceous, glabrous and shining with the veins deeply impressed above, dull, glabrate, with the veins very prominent beneath; flowers axillary or lateral on rather stout pubescent peduncles, 1.5–3 cm. long, 2-bracted at the summit, the bracts ovate-oblong, 4 mm. long, deciduous; calyx densely white-tomentulose and black-dotted, 6 mm. long, open in the bud; petals white, somewhat longer than the calyx; ovary 2-celled; fruit ellipsoid, about 1 cm. long, the calyx persistent.

Palm barrens, Camaguey, Santa Clara. Type from Santa Clara (*Britton & Cowell 13328*).

Psidium (?) **ophiticola** Britton & Wilson, sp. nov.

A shrub, about 2 dm. high, the twigs densely tomentulose, terete. Leaves mostly elliptic, coriaceous, 4 cm. long or less, rounded or retuse at the apex, rounded or obtuse at the base, obsoletely veined and glabrous above when old, densely whitish-tomentulose and with pinnate venation beneath, the short stout petioles 1–2 mm. long; flowers solitary in the upper axils; peduncles slender, puberulent, 2–4 cm. long; calyx-lobes elliptic to ovate, 4 mm. long, 3 mm. broad, tomentose; petals oval, 6 mm. long, 4.5 mm. broad.

Dry rocky soil, serpentine hills near mouth of the Rio Yamaniguey, Oriente (*Shafer 4278*).

Psidium saxicola Britton & Wilson, sp. nov.

A shrub, 1 m. high, with terete, nearly erect, densely short-pubescent branches. Leaves ovate or elliptic-ovate, subcoriaceous, very nearly sessile, densely copiously punctate, acute or obtuse at the apex, subcordate or rounded at the base, glabrous and indistinctly veined above, pubescent on the rather prominent veins beneath, the midvein impressed above, elevated on the underside; flowers solitary in the axils; peduncles short-pubescent, 2–6 cm. long; bractlets 2, subfoliaceous, ovate-oblong, pubescent, 4–7 mm. long; ovary pubescent; calyx-lobes tomentose, elliptic-ovate to oval, 3.5 mm. long, 3 mm. broad, ciliate; petals broadly obovate to suborbicular, 8.5–9 mm. long, 6.5–7 mm. broad; young fruit oblong, pubescent, 9 mm. long.

Rocky coastal hills, Santiago Bay, Oriente. Type from El Morro (*Britton & Cowell 12544*).

Calyptranthes Clementis Britton & Wilson, sp. nov.

A shrub, 2–3 m. high; young twigs terete, densely brown-pilose, the older ones glabrous. Leaves subcoriaceous, elliptic-lanceolate, 5–8 cm. long, 3 cm. wide or less, rather distinctly pinnately veined with the midvein slightly impressed above and prominent beneath, the upper surface glabrous, dull green, the under surface pale, densely pilose when young, glabrous when old, the apex long-acuminate, the base rounded or obtuse, the stout petioles 2–4 mm. long; peduncles 0.6–1.8 cm. long, pilose with brownish hairs; heads densely bracted, the bracts brown-pilose, the outer bracts lanceolate, 6–7.5 mm. long, 2.8–3 mm. broad, pinnately-veined, the inner ones smaller; hypanthium densely brown-pilose; fruit (immature) subglobose, 7 mm. in diameter, tuberculate, sparingly pilose.

Loma de Ponciano, Sancti Spiritus mountains, Santa Clara, about 750 m. altitude (*Léon & Clement 6680*).

Calyptranthes Caroli Britton & Wilson, sp. nov.

A shrub, about 3 m. high, the young twigs terete, loosely brown-pilose with spreading hairs, glabrous in age. Leaves subcoriaceous, narrowly elongate-lanceolate, 5–9.5 cm. long, 1.4–1.8 cm. wide, finely pinnately-veined above, reticulate-veined beneath, the midvein not or slightly elevated above, prominent beneath, the upper and lower leaf-surfaces brown-pilose when young, glabrous in age, the apex long-acuminate, the base rounded; petioles 5–7 mm. long, channelled above, pilose; heads many-flowered, sessile or nearly so, few-bracted, the bracts lanceolate, 8–9 mm. long, 3 mm. broad, keeled on the back, loosely pilose; hypanthium densely brown-pilose; fruit unknown.

Banks of Arroyo Ahoga Caballos between Catalina and Caimito, Pinar del Rio, 100–150 m. altitude (*Léon & Charles 4895*).

Calyptranthes clarensis Britton & Wilson, sp. nov.

A shrub or small tree, up to 3 m. high or a little higher; young twigs subterete, pilose with short, mostly appressed hairs, glabrous in age. Leaves subcoriaceous, elliptic-lanceolate or elliptic-oblanceolate, 2–4 cm. long, 7–14 mm. wide, rather indistinctly pinnately veined on both surfaces, the midvein impressed above, prominent beneath, the upper surface glabrous or nearly so, the lower surface appressed-pilose when young, glabrous or nearly so in age, acuminate at the apex, cuneate at the base; petioles 2–2.5 mm. long; inflorescence 1–3-flowered; peduncles 2–2.5 cm. long, slender, puberulent with appressed hairs when young,

glabrous or nearly so in age; hypanthium appressed brown-pilose; fruit unknown.

Sierra del Caballete, Sancti Spiritus mountains, Santa Clara, at 800–850 m. altitude (*Léon & Clement 6540*).

Eugenia Cowellii Britton & Wilson, sp. nov.

A shrub, 1–2 m. high, the slender gray twigs puberulent when young, soon glabrous. Leaves oblong to orbicular-elliptic, coriaceous, very small, only 4–7 mm. long, rounded at both ends, tuberculate and veinless above, black-punctate and with the midvein rather prominent beneath, the petioles about 1 mm. long; fruit subglobose or ellipsoid, red, about 9 mm. long.

Coastal rocks, southern Oriente. Type collected at Cabañas Bay (*Britton & Cowell 12716*).

Eugenia (?) cabanasensis Britton & Wilson, sp. nov.

A tree 6 m. high, the numerous slender twigs gray, glabrous. Leaves oblong-obovate, coriaceous, light green, 8–15 mm. long, 4–6 mm. wide, rounded at the apex, narrowed or cuneate at the base, smooth, shining and with the midvein impressed above, dull, copiously tuberculate-punctate and with the midvein rather prominent beneath, the internal venation wholly obscure, the petioles about 1 mm. long; flowers and fruit unknown.

Rocky hillside, Cabañas Bay, southern Oriente (*Britton & Cowell 12820*).

Eugeina moensis Britton & Wilson, sp. nov.

A shrub or a slender tree up to 5 m. high, glabrous throughout, the slender twigs densely leafy. Leaves narrowly oblong or linear-oblong, 2.5–4 cm. long, 6–10 mm. wide, rounded or obtuse at the apex, narrowed at the base, tuberculate-punctate on both sides, the midvein lightly impressed above, faint beneath, the lateral venation almost wholly obscure, the rather stout petioles 4–7 mm. long; flowers axillary, solitary, on filiform peduncles about 2 cm. long; calyx about 2.5 mm. long, its lobes ovate; young fruit narrowly oblong, 6 mm. long.

Rocky banks of mountain stream, Camp La Gloria, south of Sierra Moa (*Shafer 8100*).

A shrub with similar foliage, but with the leaves nearly smooth on both sides and the midvein prominent beneath, growing along a rocky river near Camp San Benito, Oriente, at 900 meters elevation, may be a related species.

Eugenia havanensis Britton & Wilson, sp. nov.

A shrub about 2 m. high, the young twigs glabrous or slightly puberulent. Leaves obovate to elliptic or oval, 2.5–3.8 cm. long, 1.5–2.3 cm. broad, rounded at the apex, acute at the base, above rather light green, lustrous and finely tuberculate-glandular when young, dark green and smooth or nearly so in age, beneath glabrous, paler and finely tuberculate-glandular, the midrib prominent; flowers axillary, solitary; pedicels slender, 1–3 cm. long, glabrous or slightly pubescent; calyx-tube about 3 mm. long, puberulent with appressed whitish hairs, its lobes unequal, rounded-ovate to suborbicular, ciliolate; petals obovate, 8 mm. long, 5–5.5 mm. broad, ciliolate.

On hills, Havana. Type collected at Cuabal north of Minas (*Léon & Roca 6212*). Possibly a species of *Psidium*.

Eugenia varia Britton & Wilson, sp. nov.

A low shrub, only about 2 dm. high, some of the branches decumbent and radicant; young twigs puberulent, the older ones gray and glabrous. Leaves chartaceous, various in form, ovate to elliptic or suborbicular, 2 cm. long or less, acute, obtuse or rounded at the apex, mostly rounded at the base, distinctly pinnately veined, the upper surface tuberculate, the petioles 1–1.5 mm. long; flowers few or solitary, mostly in the upper axils; pedicels puberulent, 3 mm. long or less; calyx 1–1.2 mm. long, sparingly pubescent, its lobes rounded-ovate to ovate, obtuse or acutish at the apex, ciliate; petals oval to suborbicular, 1.8–2 mm. long, 1.7–2 mm. broad, rounded at the apex; fruit subglobose, 5 mm. long.

Banks, Pinar del Rio. Type collected between San Diego and La Palma (*Léon 5158*).

Eugenia (?) **Earlei** Britton & Wilson, sp. nov.

A shrub about 2 m. high, with short terete glabrous twigs. Leaves elliptic or ovate-elliptic, chartaceous, 2.5–4 cm. long, 3 cm. wide or less, distinctly pinnately veined, obtuse, rounded or bluntly acute at the apex, obtuse at the base, bright green, shining, somewhat tuberculate above and with impressed midvein, pale green, dull and with midvein prominent beneath, the stout petioles about 1 mm. long.

Valley near Guanabana, Trinidad Mountains, Santa Clara, 260 m. altitude (*Britton, Earle & Wilson, 4771*).

Eugenia Rocana Britton & Wilson, sp. nov.

A shrub, about 2 m. high, the slender young twigs puberulent, the older ones gray, terete, glabrous. Leaves oblong or oblong-lanceolate, subcoriaceous, 2.5 cm. long or less, acute at the apex, obtuse at the base, the midvein impressed above, prominent beneath, the lateral venation delicate, not prominent, the upper surface tuberculate, the puberulent petioles about 1 mm. long; flowers solitary or few together and nearly sessile; calyx 1.5 mm. long, densely whitish-pubescent with appressed hairs, its lobes triangular to triangular-ovate, 2–2.5 mm. long, acuminate.

Rocky summit of Sierra de Anafe, Havana (*Léon & Roca 7142*).

Eugenia clarensis Britton & Wilson, sp. nov.

A tree about 6 m. high, the slender young twigs puberulent. Leaves oblong or oblong-oblanceolate, subcoriaceous, 2.8 cm. long or less, 6–10 mm. wide, acute at the apex, mostly obtuse at the base, the midvein impressed above, prominent beneath, the lateral venation wholly obscure, the upper surface tuberculate, the stout petioles about 1.5 mm. long; flowers axillary, solitary or in 2–4-flowered clusters; pedicels 2–4 mm. long, pubescent; bractlets lanceolate; calyx-tube whitish-pubescent with long hairs, 2 mm. long, its lobes ovate, acuminate at the apex, ciliate; petals oval, 5 mm. long, 3 mm. broad, rounded at the apex.

Woods, Pitajones, Santa Clara (*Shafer 12275*).

Eugenia anafensis Britton & Wilson, sp. nov.

A shrub about 2 m. high, the young twigs slender, densely puberulent. Leaves oblong or oblong-lanceolate, chartaceous, glabrous, 3–5 cm. long, 9–18 mm. wide, acute or short-acuminate at the apex, obtuse or narrowed at the base, the midvein impressed above, prominent beneath, the lateral venation delicate, not prominent, the upper surface tuberculate; flowers solitary and very nearly sessile in the axils; fruit subglobose, about 8 mm. in diameter, the persistent calyx-lobes triangular to triangular-ovate, 2.5 mm. long, acute.

Rocky hillside, Sierra de Anafe, Pinar del Rio (*Wilson 11587*).

Eugenia ignota Britton & Wilson, sp. nov.

A shrub about 3 m. high, the young twigs, inflorescence and veins of the young leaves appressed-pubescent. Leaves oblong to elliptic, thin-chartaceous, 3 cm. long or less, 8–16 mm. wide,

acute at the apex, narrowed or obtuse at the base, rather distinctly pinnately veined, smooth and glabrous above, punctate and with some scattered hairs beneath, the midvein impressed in the upper surface, prominent on the lower, the puberulent petioles 1–2 mm. long; flowers few, in small bracteolate axillary clusters; pedicels 2–3,5 mm. long; calyx about 1.5 mm. long, pubescent with scattered, appressed hairs, its lobes rounded-ovate, acute or short-acuminate.

Coastal plain, San Juan, Isle of Pines (*Britton & Wilson 15455*).

Eugenia Bakeri Britton & Wilson, sp. nov.

Young twigs puberulent, slender, terete, soon becoming glabrous. Leaves oblong to oblong-lanceolate, coriaceous, 2–3.5 cm. long, acute or short-acuminate at the apex, narrowed at the base, shining, copiously impressed-punctate with impressed midvein but otherwise nerveless above, dull, pinnately veined and with midvein prominent beneath, the stout petioles about 1 mm. long; flowers solitary or 2 or 3 together in the axils, sessile; calyx 2 mm. long, more or less loosely pubescent with brownish hairs, its lobes rounded-ovate to oval, obtuse or rounded at the apex.

Santa Catalina, Pinar del Rio (*Baker 969*).

A barren specimen with similar foliage but with leaves rounded at base, from Rio Guao, Pinar del Rio (*Britton & Cowell 10102*), may represent this species or a related one.

Family MELASTOMACEAE

Tamonea (?) moensis Britton, sp. nov.

A glabrous shrub or small tree. Leaves coriaceous, elliptic or ovate-elliptic, acute or acuminate at the apex, narrowed at the base, entire, 4.5–7 cm. long, 3-nerved, the 2 lateral veins arising just above the base, the veins impressed above, prominent beneath, the secondary venation delicate, the rather stout petioles 6–9 mm. long; panicle loosely few-flowered; pedicels slender, 10–14 mm. long; fruit globose, glabrous, about 7 mm. in diameter, the persistent calyx-limb truncate.

Camp La Gloria, south of Sierra Moa, Oriente (*Shafer 8073, type; 8038*).

Calycogonium saxicola Britton & Wilson, sp. nov.

A low shrub, about 6 dm. high, the young twigs, petioles and leaf-blades finely scurfy. Leaves subcoriaceous, bright green,

shining, ovate to elliptic, 1–2.5 cm. long, acute or acuminate at the apex, mostly narrowed at the base, 3-nerved, the lateral veins arising just above the base, the secondary venation indistinct, glabrous on both sides when old, except for a tuft of short hairs in the axils of the lateral veins; flowers 5-parted, solitary or 2 together at the end of a peduncle, 1–1.5 cm. long; pedicels filiform, 5–10 mm. long; calyx-tube terete, subcampanulate, 5 mm. long, its 5 subulate teeth 2–2.5 mm. long; anthers a little shorter than the filaments; petals white, obovate, obtuse, 7–8 mm. long; fruit black, subglobose, about 6 mm. in diameter.

Rocks, vicinity of Sumidero, Pinar del Rio. Type from Sierra Caliente (*Shafer 13770*).

Pachyanthus Clementis P. Wilson, sp. nov.

A shrub with densely ferruginous twigs and branches. Leaves ovate-lanceolate, 9–12 cm. long, 3.5–4.5 cm. broad, glabrous or nearly so above, pubescent beneath with stellate hairs, cordate at the base, acuminate at the apex, coriaceous, petioled, 3–5-nerved, the veins and lateral nerves prominent beneath, slightly impressed above; inflorescence peduncled; calyx urn-shaped, 7–8 mm. long, 4–5 mm. broad, densely pubescent with rather long shaggy hairs, the lobes long-acuminate.

Loma Los Helechales, Banao Mountains, Santa Clara (*Léon & Clement 5399*).

Pachyanthus mantuensis Britton & Wilson, sp. nov.

A shrub 1 m. high or less, the branches, twigs and calyx densely scurfy with brownish stellate scales. Leaves 4–8 cm. long, 2–3.6 cm. broad, elliptic to elliptic-ovate, obtuse at the apex, rounded and subcordate at the base, yellowish green, punctate and glabrous or nearly so above, slightly paler and scurfy especially on the veins beneath, coriaceous; pedicels 1–1.5 cm. long; calyx urn-shaped, the lobes with a short keel on the back near the apex; petals ovate-oval to oval, 12 mm. long, 7–8 mm. broad, rounded at the apex, puberulent.

Dry prairie land, between Guane and Mantua, Pinar del Rio (*Shafer 11229*).

Ossaea Shaferi Britton & Wilson, sp. nov.

A shrub 1–2 m. high, with densely hirsute twigs, leaves and inflorescence. Leaves ovate to ovate-lanceolate, 4–9 cm. long, 5-nerved, acute or acuminate at the apex, rounded or obtuse at the base, the upper surface densely and finely tuberculate, each

tubercle bearing a stiff bristly hair; veins of the under leaf-surface strong and elevated, two of the lateral ones arising from near the base, the other two arising from above the base; petioles stout, 2 cm. long or less; flowers 2–4, sessile at the end of a short stout peduncle, or some of them solitary; calyx densely hirsute, its 5 lobes subulate, long-ciliate, about 3 mm. long; fruit densely hirsute.

Thickets, mountains of northern Oriente. Type from Camp La Gloria, south of Sierra Moa (*Shafer 8152*).

Ossaea navasensis Britton & Wilson, sp. nov.

A shrub about 2 m. high, with reddish or reddish-brown scurfy twigs and petioles. Leaves lanceolate-ovate to ovate, 3–5 cm. long, 1.3–2 cm. broad, 3-nerved, acuminate at the apex, acute at the base, glabrous and dull above, the primary veins impressed, paler beneath, the primary veins rather prominent; petioles 5–11 mm. long, ciliate; flowers axillary, solitary or few, sessile; calyx-lobes 4, linear-lanceolate, long-ciliate; petals acute.

Dense woods, trail, Navas to Camp Buena Vista, Oriente (*Shafer 4449*).

Ossaea nipensis Britton & Wilson, sp. nov.

A shrub 1 m. high, with brownish or reddish-brown scurfy twigs and petioles. Leaves ovate, 1.5–3 cm. long, 7–18 mm. broad, 3-nerved, acute to short-acuminate at the apex, the tip obtuse, rounded or somewhat acutish at the base, dark green, and glabrous above, the primary veins impressed, brown and somewhat scurfy beneath, the veins rather prominently elevated; petioles 4–6 mm. long, slender; flowers solitary or few, subsessile; calyx-lobes 4, minute, broadly triangular, acute; petals oblong-elliptic, 1.5 mm. long, 0.8 mm. broad, acute; young fruit subglobose, 2 mm. in diameter.

Rich woods, Sierra Nipe, near Woodfred, Oriente (*Shafer 3439*).

Family ERICACEAE

Kalmiella simulata Britton & Wilson, sp. nov.

A shrub 6–9 dm. tall, with glabrous foliage and puberulent branches; leaves thick, lanceolate-subulate on account of the strongly revolute margins, 5–6 mm. long, 1–1.5 mm. broad, bright green and shining above, paler beneath, sessile; pedicels longer than the leaves, sparsely glandular-pilose; sepals lanceolate, 5

mm. long, obtuse or acutish, glabrous; corolla pinkish-white, 12–13 mm. broad; filaments pubescent near the base; capsule immature.

White sandy places, vicinity of Los Indios, Isle of Pines (*Britton & Wilson 14205*).

Family APOCYNACEAE

Rauwolfia linearifolia Britton & Wilson, sp. nov.

A glabrous shrub 4.5 dm. high, with slender grayish branches. Leaves in whorls of 3's, linear, 4–6.5 cm. long, 3–4 mm. wide, dark green above, paler beneath, the midvein prominent on both surfaces, the lateral veins indistinct; calyx-lobes lanceolate, 1–1.5 mm. long, acute to acuminate; corolla purplish, its tube slender, 7–9 mm. long, the lobes elliptic, 4 mm. long, 1.3 mm. wide; ovary immersed in a cup-shaped disk; style filiform; carpels two, united at the base, one carpel sometimes abortive.

Type collected on limestone hill, Paso Estancia to the Pinales, Oriente (*Shafer 1754*).

Echites minima Britton & Wilson, sp. nov.

Stems slender, twining, puberulent. Leaves oblong, 1–2 cm. long, 4–5 mm. broad, acuminate at the apex, rounded and cordate at the base, glabrous, short-petioled, the midvein indistinct above, prominent beneath; calyx-lobes elliptic-lanceolate to elliptic, 2–2.5 mm. long, 1–1.1 mm. broad, acuminate at the apex; corolla-tube 3–3.5 mm. long, the lobes suborbicular, light yellow, 3.5 mm. long, 4 mm. broad.

In dry grassy places, barren savannas southeast of Holguin, Oriente (*Shafer 2955*).

An incomplete specimen from savannas between Queen City and Minas, Camaguey (*Shafer 2928*), is referred to this species with doubt.

Family CONVOLVULACEAE

Exogonium incertum Britton, sp. nov.

Vine, slender, glabrous up to 8 dm. long or longer. Leaves unknown; corymbs few–several-flowered, short-peduncled; pedicels 5–12 mm. long; sepals about 6 mm. long, elliptic-ovate, obtuse or rounded; corolla tubular-funnelform, glabrous, pink with a purple throat, 3–4 cm. long, its tube very narrow within the calyx, gradually enlarged above, its limb about 1.5 cm. broad; capsule

ovoid-globose, 8 mm. long; seeds oblong, with long brown hairs.

Hillsides, northwestern Oriente. Type from Loma Pilon, in eruptive mountains near Holguin (*Shafer 1235*).

Family HYDROPHYLLACEAE

Nama cubana P. Wilson, sp. nov.

A spiny shrub 2–3.5 dm. tall, with puberulent twigs. Leaves obovate or somewhat obovate-spatulate, 1–2.5 cm. long, 3–6 mm. broad, glabrous or nearly so, rounded or acutish at the apex, cuneate at the base, short-petioled; sepals ovate, 5–7 mm. long, 3.5–5 mm. broad, acute or rounded at the apex, glabrous; capsule subglobose, 3–3.5 mm. long, glabrous; styles mostly 3, shorter than the sepals.

In mud, Columbia, Camaguey (*Shafer 619*).

Family CORDIACEAE

Varronia Shaferi Britton, sp. nov.

Shrub-like, branched, the twigs, petioles and peduncles appressed-pubescent, scabrous. Leaves oblong or oblong-lanceolate, coriaceous, entire, 8 cm. long or less, 2–4 cm. wide, acute or acuminate at the apex, narrowed and acute at the base, shining and glabrous or nearly so above, short-pubescent beneath, the veins impressed above, prominent beneath, the rather stout petioles 1–2 cm. long; peduncles terminal, rather stout, 5–8 cm. long; flowers densely short-spicate; spikes 1.5–3 cm. long, about 1 cm. thick; calyx strigose, about 6 mm. long, its triangular lobes tapering into a linear, caudate tip; corolla 3.5–4 mm. long, white, a little longer than the calyx-tube, its lobes short, rounded; fruit oval, about 7 mm. long.

Moist woods between Navas and Camp Buena Vista, Oriente, at 650 meters altitude (*Shafer 4448*).

Bourreria Taylori Britton, sp. nov.

A tree, 5–8 m. high, the young twigs and inflorescence loosely pilose. Leaves spatulate-oblanceolate, subcoriaceous, 3–7 cm. long, 2 cm. wide or less, obtuse or rounded at the apex, cuneate at the base, smooth, glabrous and reticulate-veined above, sparingly pilose beneath, the petioles 2–4 mm. long; inflorescence paniculate, several-flowered; calyx oblong-campanulate, densely pilose, about 6 mm. long, its teeth triangular, acute; styles united to above the middle, stout; fruit orange-red, globose, about 8 mm. in diameter.

Sevilla Estate, near Santiago, Oriente, at 260 m. elevation (*Taylor 431*).

Rochefortia stellata Britton & Wilson, sp. nov.

A tree, 5 m. high, with grayish, flexuose branches and puberulent spiny twigs. Leaves elliptic, subcoriaceous, brittle, 1.5–2.8 cm. long, 1.2–1.8 cm. wide, rounded and occasionally slightly emarginate at the apex, rounded at the base, short-petioled, lustrous and glabrous or with few scattered stellate hairs above, densely puberulent beneath with grayish, stellate hairs; flowers solitary or several, axillary, short-pedicelled; calyx densely stellate-tomentulose, the lobes triangular-ovate; corolla-tube short, the lobes elliptic-ovate to elliptic, 4 mm. long, 2.5 mm. wide, ciliolate; ovary glabrous, the styles separate to near the base, pubescent; young fruit subglobose, 6 mm. in diameter, glabrous.

Coastal thicket, Ensenada Cabanita, Oriente (*Britton & Cowell 12634*).

Rochefortia cubensis Britton & Wilson, sp. nov.

A shrub with brownish-gray, puberulent, spiny twigs. Leaves elliptic, chartaceous, 6–9 mm. long, 3–6 mm. wide, rounded at both ends, the base occasionally somewhat inequilateral, pubescent above with simple, scattered, appressed hairs, glabrous or nearly so beneath, short-petioled; calyx-lobes ovate, ciliate, 2.5 mm. long; fruit subglobose, 4.5 mm. in diameter, yellowish-red.

Thicket east of Playa de Marianao (*Léon 7228*).

Family VERBENACEAE

Duranta arida Britton & Wilson, sp. nov.

A strict shrub, 1–3 m. high, the slender twigs and branches of the inflorescence puberulent. Leaves obovate to elliptic or oval, 0.6–1.5 cm. long, 0.5–0.9 cm. wide, acute or rounded at the apex, cuneate or obtuse at the base, entire or minutely and sparingly denticulate above the middle, dark green, glabrous and inconspicuously veined above, paler and glabrous beneath, the lateral veins three or four on each side of the midvein; petioles 1–2 mm. long, slender; fruit subglobose, 5 mm. in diameter, on pedicels 1 mm. long.

Thickets, Sabana to Maisi, Oriente (*Shafer 7904, type; 7911*).

Callicarpa Shaferi Britton & Wilson, sp. nov.

A shrub up to 3.3 m. high, the twigs, petioles, under leaf-surfaces and inflorescence densely white stellate-scurfy. Leaves

oblong, oblong-lanceolate or oblong-oblanceolate, chartaceous, 3–8 cm. long, 1–3 cm. wide, entire or very nearly so, acute, obtuse or rounded at the apex, obtuse, subtruncate or narrowed at the base, dark green, finely reticulate-veined and glabrous above, strongly reticulate-veined beneath, the slender petioles 5–12 mm. long; cymes small, peduncled, much shorter than the leaves; pedicels very short; calyx obconic, white stellate-scurfy, 1.5 mm. wide, the lobes very short, broadly triangular; corolla pink, 3–3.5 mm. long, the lobes oval, rounded at the apex; filaments filiform, exserted; fruit subglobose, scurfy, blue, 3.5–4 mm. in diameter.

Limestone hills and plains, Pinar del Rio and Isle of Pines. Type from limestone hills, vicinity of Sumidero, Pinar del Rio (*Shafer 13526*).

Callicarpa Wrightii Britton & Wilson, sp. nov.

A shrub, 6–12 dm. high, the twigs, petioles and inflorescence densely brown stellate-scurfy. Leaves obovate to elliptic or oblong, membranous, 7–12 cm. long, 1.5–5 cm. wide, crenate-serrate at least above the middle, acuminate at the apex, cuneate at the base, dark green, glabrous and inconspicuously veined above, green, sparingly stellate on the principal veins, lightly reticulate-veined and copiously resinous-dotted beneath, the petioles 5–9 mm. long; cymes few-flowered, short-peduncled, much shorter than the leaves, sometimes not longer than the petioles; fruit greenish, about 5 mm. in diameter, on pedicels about 1.5 mm. long.

Valleys and hillsides, northern Oriente. Type from Moa Bay, east of Rio Moa (*Shafer 8308A*).

Callicarpa cuneifolia Britton & Wilson, sp. nov.

A shrub up to 2 m. high, the twigs, petioles, under leaf-surfaces and branches of the inflorescence densely stellate-pubescent with ferruginous hairs. Leaves obovate or elliptic, chartaceous, 4–7 cm. long, 1.5–3 cm. wide, crenulate, acute or acuminate at the apex, cuneate at the base, dark-green and somewhat scabrous above, the midvein strongly impressed, reticulate-veined and finely glandular beneath, the petioles about 6 mm. long; cymes small, peduncled, shorter than the leaves; pedicels 1.5–2 mm. long; calyx 3 mm. broad; fruit subglobose, 4 mm. in diameter, puberulent when young, glandular.

Hillsides and pine woods, northern Oriente. Type from a dry serpentine hill, Loma Santa Teresa, near El Yunque (*Shafer 7741*).

Callicarpa nipensis Britton & Wilson, sp. nov.

A shrub about 6 dm. high, the twigs, inflorescence, petioles and under leaf-surfaces densely brown stellate-tomentose. Leaves linear-oblong, coriaceous, entire or very slightly repand, 12 cm. long or less, 8–18 mm. wide, acute at the apex, narrowed at the base, tapering gradually from near the middle to both ends, dark green and minutely setulose with impressed venation above, strongly elevated-veined beneath, the rather stout petioles 6–9 mm. long; cymes peduncled, shorter than the leaves, several-flowered; fruit blue, compressed, short-pubescent, about 7 mm. broad.

Border of pinelands, Sierra Nipe, near Woodfred, Oriente, 450–550 meters altitude (*Shafer 3026*).

Vitex Clementis Britton & Wilson, sp. nov.

Young twigs rather slender, densely tomentulose. Leaves 3-foliolate; petioles slender, tomentulose, 2–7 cm. long; petiolules 2 cm. long or less; leaflets oblong-elliptic, 6–10 cm. long, rather thin, acute or obtuse at the apex, narrowed at the base, glabrous above, or nearly so, except upon the impressed veins, densely tomentulose and with elevated veins beneath; cymes several or numerous, panicled, few–several-flowered, tomentulose; pedicels 2–5 mm. long; calyx short-campanulate, about 6 mm. broad, its lobes suborbicular, ciliate; corolla purple, 1.5–1.7 cm. broad, villous on the outside, its lobes very unequal, its tube 6 mm. long.

Coastal thickets, Santiago, Oriente (*Clement 168, type*); collected also at Cabo Cruz, as shown by a specimen from the Sauvalle Herbarium.

Pseudocarpidium Shaferi Britton, sp. nov.

A shrub or small tree up to 4 m. high, the young twigs, petioles and under leaf-surfaces whitish-tomentulose. Leaves oblong, or oblong-oblanceolate, coriaceous, 3.5 cm. long or less, 6–10 mm. wide, entire, or rarely with 1 or 2 spinulose teeth, acute and spinulose-tipped, the base subcuneate, the principal veins delicate above, rather prominent beneath, the upper surface dark green, glabrous, densely and finely reticulate-veined; panicle slender, puberulent, a little longer than the leaves; calyx 2 mm. long, its ovate, sharply acute lobes somewhat shorter than the tube; corolla puberulent, about 5 mm. long; fruit densely pubescent, 4-lobed, depressed, 4–6 mm. broad.

Coastal thickets between Sabana and Maisi, Oriente (*Shafer 7901*).

Clerodendrum anafense Britton & Wilson, sp. nov.

A tree up to 10 m. high, the twigs and petioles very minutely and sparsely hispidulous. Leaves elliptic or somewhat elliptic-obovate, 4–9 cm. long, 2–4.5 cm. wide, obtuse or acute at the apex, rounded or acutish at the base, light green and glabrous, or minutely and obscurely hispidulous on the mid-vein above, paler, coarsely reticulate-veined and glabrous beneath, entire, coriaceous, short-petioled; calyx campanulate, 3.5–4 mm. wide, subtruncate at the apex, glabrous; corolla 2–2.5 cm. long, white, the lobes oblanceolate to obovate; filaments filiform, exserted; anthers narrowly ovate or elliptic.

Rocky hillsides, Sierra de Anafe, Pinar del Rio (*Wilson & Léon 11466*).

Clerodendrum camagueyense Britton & Wilson, sp. nov.

A shrub 1–1.2 m. high, the twigs and petioles tuberculate and minutely hispidulous with mostly appressed hairs. Leaves obovate or elliptic-obovate, 7–11 cm. long, 3.5–6 cm. wide, dark green, lustrous and hispidulous on the veins above, the secondary veins inconspicuous, paler, coarsely reticulate-veined and minutely hispidulous on the veins beneath, the margin denticulate; petioles 1 cm. long; calyx narrowly campanulate, subtruncate at the apex, glabrous; corolla about 4 cm. long, white, the lobes oblanceolate; stamens exserted.

Savanna south of Sierra Cubitas, Camaguey (*Shafer 496*).

Family LAMIACEAE

Salvia scabrata Britton & Wilson, sp. nov.

A more or less straggling shrub, 1–1.2 m. tall, with hispid twigs. Leaves obovate, 4–6 cm. long, 1.5–2.2 cm. broad, obtuse or acutish at the apex, cuneate at the base, dull and glabrous above, paler and conspicuously punctate beneath, crenulate-serrate; petioles about 7 mm. long, hispid; racemes axillary, the verticels 3–5 cm. apart, few-flowered; pedicels 5–6 mm. long; calyx 11–12 mm. long, its lobes ciliolate, acute; corolla red or scarlet, 2–2.5 cm. long, tomentose.

Mountains of northern Oriente. Type from along a rocky river, near Camp San Benito, 900 m. altitude (*Shafer 4075*).

Salvia cubensis Britton & Wilson, sp. nov.

A more or less erect shrub, 1–1.5 m. tall, with puberulent twigs. Leaves oblanceolate or lanceolate, 4–9 cm. long, 1.2–2.5

cm. broad, obtuse to acute or acuminate at the apex, cuneate at the base, dull and glabrous above, paler beneath, punctate and serrulate or nearly entire, short-petioled; racemes terminal, the verticels 5–12 mm. apart; pedicels 2–3 mm. long, puberulent; calyx 5–7 mm. long, its lobes acuminate; ciliolate; corolla scarlet, 1.8–2.2 cm. long, tomentose.

Rocky places, mountains of northern Oriente. Type from along shaded stream near base of Loma Mensura, about 680 m. altitude (*Shafer 3766*).

Hyptis Shaferi Britton, sp. nov.

Creeping, rooting at the nodes, branched or simple, 1 m. long or less, sparingly and loosely pubescent or glabrate. Leaves ovate or orbicular-ovate, irregularly dentate, 2–5 cm. long, acute or obtuse at the apex, narrowed or cuneate at the base, the petioles 2–8 mm. long; heads peduncled, solitary in the axils, depressed-globose, densely many-flowered, 1.5–2.2 cm. in diameter; peduncles slender, 1–5 cm. long; involucre-bracts oblong-lanceolate, acute or acutish, veiny, spreading, 6–8 mm. long; calyx tubular, 7–8 mm. long, its subulate ciliate teeth about one-half as long as the tube; corolla white or pinkish.

Grassy places, Pinar del Rio. Type from between Mantua and Arroyos (*Shafer 11248*).

Hyptis rivularis Britton, sp. nov.

Erect, much branched, slender, but stiff, densely puberulent, 1.3 m. high, the branches slender. Leaves of the stem not seen; leaves of the branches opposite, oblong-oblanceolate, 10–15 mm. long, puberulent on both sides, few-dentate, acutish at the apex, cuneate at the base, the petioles 1–2 mm. long; flowers opposite or verticillate in the axils; fruiting pedicels about 1 mm. long, filiform; fruiting calyx densely puberulent, oblong, faintly veined, about 4 mm. long, the lanceolate subulate teeth about one-half as long as the tube.

River bank, Trinidad, Santa Clara (*Britton & Wilson 5567*).

Family SOLANACEAE

Physalis ignota Britton, sp. nov.

Annual; stem branched, often zigzag, angled and more or less densely villous with short hairs. Leaves ovate, 4–15 cm. long, 3–10 cm. wide, oblique and cuneate or somewhat rounded at the

base, acute to acuminate at the apex, entire or somewhat repand-dentate, puberulent at least on the veins, long-petioled; peduncles 5–7 mm. long, erect, in fruit 9–12 mm. long, reflexed; calyx 3.5 mm. long, densely short-villous, the lobes lanceolate, about as long as the tube; corolla campanulate, short-pilose, 5–5.6 mm. wide, yellow, without a dark center; fruiting calyx ovoid, 3–4.5 cm. long, 2.5–3 cm. wide, angled.

Waste places and river banks, Camaguey, Santa Clara and Havana (type, *Britton & Wilson 5767*); Guatemala.

Solanum moense Britton & Wilson, sp. nov.

A straggling tree 3 m. high, the slender twigs and branches armed with brownish prickles 2–2.5 mm. long, hispid with ferruginous, stalked, stellate hairs. Leaves oblong to elliptic, 6–9 cm. long, 2.2–3.5 cm. broad, acute to acuminate at the apex, somewhat inequilateral and rounded at the base, entire with the margin more or less revolute, lustrous and with few slender brownish prickles above, the midvein and primary veins impressed, paler, dull and hispid beneath with stalked stellate hairs, the midvein and primary veins prominent; petioles 4–5 mm. long; peduncles 3.5 cm. long, stellate-hispid; fruiting calyx 2 cm. wide; berries globose, 2.5 cm. in diameter; seeds suborbicular, 4 mm. long, 5 mm. broad, flattened.

Thickets, Camp La Gloria, south of Sierra Moa, Oriente (*Shafer 8125*).

Cestrum Wrightianum P. Wilson, sp. nov.

A shrub about 1 m. high, the branches conspicuously tomentose with branching star-like hairs. Leaves ovate, 5–8.5 cm. long, 2.5–4.8 cm. broad, short-acuminate at the apex, rounded and more or less subcordate at the base, sparingly tomentose on both surfaces when young with ferruginous star-like hairs; petioles 5–9 mm. long, tomentose; inflorescence shorter than the leaves; calyx cylindric, tomentose, its lobes triangular, about 1 mm. long; corolla 1.9–2.2 cm. long, the tube rather slender, the lobes lanceolate, 5–6 mm. long, acuminate; filaments slender, pilose, adnate to a little above the middle of the corolla-tube; style slender; stigma subcapitate, included.

Cuba (*C. Wright 386*, herb. N. Y. Botanical Garden).

Cestrum Taylori Britton & Wilson, sp. nov.

A glabrous tree, 5–8 m. high, with slender pale brown twigs. Leaves elliptic to somewhat elliptic-lanceolate, 13–15 cm. long,

5–5.5 cm. broad, acute at the apex, acutish or somewhat rounded at the base, glabrous and finely reticulate-veined on both surfaces; petioles 1.3–1.6 cm. long; flowers solitary or several, axillary; calyx cylindric, about 1 cm. long, glabrous; corolla greenish-yellow, 7–8 cm. long, the tube slender, sparingly pilose within, especially near the base, the lanceolate lobes 1.2–1.5 cm. long; filaments linear, adnate to the corolla-tube nearly to its throat; anthers elliptic to somewhat elliptic-ovate; style linear, 7–7.5 cm. long, glabrous; stigma subcapitate.

Trail, Magdalena to Sierra Maestra, Oriente (*Taylor 439*).

Cestrum pinetorum Britton, sp. nov.

A glabrous shrub about 1 m. tall, with slender brownish twigs. Leaves oblong-oblanceolate to obovate, or somewhat oblong-lanceolate, 4–6.5 cm. long, 0.9–1.5 cm. broad, obtuse or acutish at the apex, cuneate at the base, dark green and often obscurely veined above, paler and obscurely veined beneath, the petioles 2–5 mm. long; panicles axillary or terminal; fruiting calyx campanulate, about 5 mm. long, subsessile, its lobes triangular-ovate, 1–1.5 mm. long; fruit obovoid to obovoid-ellipsoid, 6–7 mm. long, 5 mm. broad, purplish-black.

Open pine woods, Sierra Nipe, near Woodfred, Oriente (*Shafer 3031*).

Brunfelsia Shaferi Britton & Wilson, sp. nov.

A shrub 0.5–2 m. tall, with glabrous or somewhat puberulent brownish twigs. Leaves oblong to elliptic-oblong, oblong-oblanceolate or oblong-obovate, 3–7.5 cm. long, 0.8–1.5 cm. broad, rounded or acutish at the apex, cuneate at the base, dark green, glabrous and indistinctly veined above, the midvein impressed, paler and glabrous beneath, the midvein prominent; petioles 2–5 mm. long; calyx coriaceous, glabrous, the lobes oblong-ovate to ovate, about 3 mm. long; berry subglobose, 1–1.2 cm. in diameter, sessile or subsessile, glabrous.

Plancha trail, Mensura to Woodfred, Oriente (*Shafer 3870*).

Brunfelsia clarensis Britton & Wilson, sp. nov.

A shrub 1 m. or more high, with nearly glabrous twigs. Leaves obovate to broadly elliptic-obovate, 5–10 cm. long, 2.5–4.5 cm. broad, rounded or acutish at the apex, acute at the base, glabrous or very minutely hispidulous above with scattered hairs, minutely hispidulous to glabrous beneath, the primary veins slender and rather indistinct; petioles 1–1.4 cm. long; calyx coria-

ceous, glabrous, the lobes ovate, 4 mm. long; berry subglobose, about 1 cm. in diameter, long-pedicelled.

Mordazo, Santa Clara (*Léon & Cazanas 5928*).

Family SCROPHULARIACEAE

CHEILOPHYLLUM Pennell, gen. nov.

Stems extensively spreading, repent, much branched, four-angled, the angles narrowly winged, and with scattered, minute gland-tipped hairs. Leaves opposite, sessile, ovate, cuneate at base, slightly dentate, acutish, glandular-dotted, glabrous, the margin slightly recurved and thickened, 0.7–0.9 cm. long. Pedicels 3–5 mm. long, pubescent with gland-tipped hairs, not bracteolate. Sepals five, lance-linear, alike. Corolla 3 mm. long, white, campanulate, the lobes about equaling the tube, the two posterior united throughout; the tube pubescent within on all sides. Filaments four, glabrous, the posterior pair slightly shorter; anthers glabrous. Style glabrous. Stigmas distinct. Capsule 2–2.5 mm. long, ovate in outline, acute, glabrous, septicidal and loculicidal; the coalesced placentae thick, persisting, about one-half the length of the capsule. Seeds 2–3 mm. long, short-oblong, ridged, minutely reticulate, brownish-black. [Name from χειλος, margin, and φυλλον, leaf.]

This monotypic genus is remote from *Stemodia,* which consists of erect herbs, with anther-sacs separated on arms of the connective and with longitudinally striate seeds. Its uniform sepals readily distinguish *Cheilophyllum* from the group of genera usually called *Herpestis.*

Cheilophyllum radicans (Griseb.) Pennell, comb. nov.

Stemodia radicans Griseb. Cat. Pl. Cub. 182. 1866.

Palm barrens, Santa Clara, Havana; Jamaica.

SILVINULA Pennell, gen. nov.

Stems extensively spreading, repent, much branched, terete, strigose pubescent with ascending hairs. Leaves opposite, sessile, elliptic-oval, entire, obtuse, slightly pubescent on the margins and midrib, glandular-dotted, 0.8–1 cm. long. Pedicels 1–2 mm. long, pubescent, at apex with two minute subulate bractlets. Sepals five, dissimilar; the three outer oblong-ovate, firm, conspicuously ridged, the two inner nearly linear, thin, obscurely veined. Co-

rolla 10 mm. long, blue, nearly salverform, the lobes spreading, nearly orbicular, much shorter than the narrow tube, the two posterior united over ⅔ length; glabrous throughout. Filaments four, glabrous, the posterior pair slightly shorter; anthers glabrous. Style glabrous. Stigmas distinct. Capsule 3 mm. long, ellipsoid in outline, obtuse, glabrous, ridged, septicidal and loculicidal; the coalesced placentae and septum thin, persistent, plate-like, extending the entire length of the capsule. Seeds 3–4 mm. long, irregularly oblong, reticulate, yellowish-brown. [Named because of its resemblance to *Silvia* Benth., a Mexican genus.]

This monotypic genus is distinguished from all other segregates of *Herpestis* by the form of the corolla, and by the thick-walled, ridged capsule.

Silvinula humifusa (Griseb.) Pennell, comb. nov.

Herpestis humifusa Griseb. Cat. Pl. Cub. 183. 1866.

Muddy borders of brooks and lagoons, Santa Clara, Pinar del Rio, Isle of Pines. Endemic.

Caconapea stemodioides Pennell, sp. nov.

Stem 3–4 dm. tall, obtusely four-angled, glabrous. Leaves 4–5 cm. long, 0.5–0.8 cm. wide, narrowly lanceolate, serrate, long-attenuate to the narrow but clasping base, glabrous, with many glandular dots. Pedicels one to three to an axil, 1–1.5 mm. long, punctate with sessile glands. Bractlets two, filiform-subulate, 1.5–2 mm. long, placed immediately below calyx. Sepals: outermost 7 mm. long, broadly ovate, rounded at base, two median nearly as long, narrower, somewhat one-sided, these three obtuse to acutish, rugosely reticulate-veined, green, glabrous, the two innermost lanceolate-linear, attenuate at apex, with evident midrib, broadly hyaline, obscurely ciliolate. Corolla 5–6 mm. long, posterior lobes united about 2/5 length, pubescent within tube, especially on the anterior side, glabrous over bases of posterior lobes; "white." Filaments glabrous, the postero-lateral pair somewhat shorter, its anthers equaling those of the antero-lateral pair; posterior filament completely lost. Style glabrous, stigmas distinct. Capsule 3.5–4 mm. long, ovoid-oblong, punctate with sessile glands, dehiscing loculicidally and septicidally, the lateral portions of the septum adherent to the capsule-walls. Placentae rounded, protruding into the cells, coalescent with the persistent median part of the septum. Seeds 0.3 mm. long, oblong-cylindric, truncate at each end, nearly black, longitudinally ridged and with obscure cross-reticulations.

Type, river woods, vicinity of San Pedro, Isle of Pines, collected in flower and fruit, February 15–17, 1916 (*Britton, Wilson & Selby 14459*).

Nearest to **Caconapea decumbens** (Fernald) Pennell, comb. nov. [*Herpestis decumbens* Fernald Proc. Am. Acad. 33: 91. 1897] of Mexico, which, however, has sepals reaching 8–9 mm. long, obscurely reticulate (not rugose), corolla 8 mm. long, anther-sacs over twice as large (0.8 mm. long), and seeds nearly as wide as long and with prominent cross-reticulations.

NAIADOTHRIX Pennell, gen. nov.

Stems submersed, long, much branched, glabrous or puberulent, terete. Leaves opposite, divided so as to appear whorled, and with ultimate filiform segments. Pedicels longer than the calyx, not bracteolate. Sepals five, alike or slightly unequal. Corolla blue, campanulate-personate, pubescent within on anterior side, the lobes about equaling the tube, the two posterior lobes united over one half length. Filaments four, glabrous, the posterior pair shorter. Anthers glabrous. A circle of bristles surrounding the base of the ovary. Style glabrous. Stigmas distinct. Capsule oblong, thin-walled, glabrous, septicidal and tardily loculicidal. Coalesced placentae and septum rather thick, little over one-half length of capsule. Seeds oblong, reticulate. [Name from Ναιας, a water-nymph, and Θριξ, hair, in allusion to the finely divided leaves.]

Type species: *Naiadothrix longipes* Pennell.

Leaves, bristles surrounding ovary, and aquatic habit sharply distinguish *Naiadothrix* from all other segregates of *Herpestis*.

Naiadothrix longipes Pennell, sp. nov.

Stems, pedicels and calyx obscurely glandular-granulose. Leaves 2–2.5 cm. long, three-branched from base, each branch and its pinnate segments filiform. Pedicels 35–50 mm. long. Sepals nearly uniform, lanceolate-linear, 3 mm. long. Corolla 6–7 mm. long, glabrous within, at least the posterior lobes blue (the anterior probably yellowish). Capsule 2 mm. long. Seeds 0.7–0.8 mm. long, brown.

Type submerged in water, Laguna Jovero and vicinity, Pinar del Rio, collected in flower and fruit, December 5–7, 1911 (*J. A. Shafer 10829*).

Submerged in lagoons, Pinar de Rio and Isle of Pines. Endemic.

Nearest to **Naiadothrix reflexa** (Benth.) Pennell, comb. nov. [*Herpestis reflexa* Benth. in DC. Prod. 10: 399. 1846] of Brazil, which differs in being puberulent, and in having shorter pedicels and longer calyx. **Naiadothrix myriophylloides** (Benth.) Pennell, comb. nov. [*Herpestis myriophylloides* Benth. *l. c.*, 398. 1846], of Brazil, is the only other known species of the genus.

ENCOPELLA Pennell, nom. nov.

ENCOPA Griseb. Cat. Pl. Cub. 184. 1866. Not ENCOPEA, Presl, Bot. Bemerk. 83. 1844.

Type species: *Encopa tenuifolia* Griseb.

Encopella tenuifolia (Griseb.) Pennell, comb. nov.

Encopa tenuifolia Griseb. Cat. Pl. Cub. 184. 1866.

Sandy shores of lagoons, Santa Clara, Pinar del Rio and Isle of Pines. Endemic.

ANISANTHERINA Pennell, gen. nov.

Stem erect, 1–4 dm. tall, branching, hirsute-pubescent with reflexed-spreading dark-jointed hairs. Leaves opposite, sessile, linear, sparingly minutely lobed, scabro-pubescent above, 4–6.5 cm. long. Pedicels 25–35 (–45) mm. long, bibracteolate about the middle. Calyx of 5 united sepals, the lobes shorter than the tube. Corolla 12–14 mm. long, pinkish (not seen fresh), the lobes much shorter than the tube, the two posterior united only at base; within glabrous proximally, but pubescent over the bases of the posterior lobes. Filaments 4, lanate distally, the posterior pair shorter; anther-sacs unequal, the outer one smaller, glabrous. Style glabrous. Stigma linear, consisting of two lines, one down each side of style-apex. Capsule 7–8 mm. long, globose with a mucro, glabrous, loculicidal and septicidal. Seeds 0.6–0.8 mm. long, oblong-linear, reticulate, dark-brown, wingless. [Name from *ανισος*, unequal, and *ανθηρα*, anther.]

This monotypic genus resembles *Agalinis*, which however has both anther-sacs alike, pedicels not bracteolate, and seeds wider.

Anisantherina hispidula (Mart.) Pennell, comb. nov.

Gerardia hispidula Mart. Nov. Gen. et Sp. 3: 13. 1829.

Moist savannas and borders of lagoons in pineland, Santa Clara, Pinar del Rio, Isle of Pines; Panama; Brazil.

Family BIGNONIACEAE

Tabebuia camagueyensis Britton & Wilson, sp. nov.

A shrub or a small tree up to 7 m. high, the twigs lepidote. Petioles 1–2.5 cm. long; leaves 5–1-foliolate, glabrous; leaflets chartaceous, elliptic to oblong or obovate, more or less lepidote, 4–6 cm. long, rounded or emarginate at the apex, mostly narrowed at the base, dark green and dull above, pale green beneath; flowers few together on rather stout pedicels 1.5–2.5 cm. long; bractlets subulate, 4 mm. long; calyx narrowly campanulate, about 15 mm. long, obliquely toothed; corolla light pink to rose, campanulate, about 6 cm. long; capsule linear, slightly curved, short-beaked, 9–15 cm. long, about 6 mm. thick.

Savannas near Camaguey (*Britton & Cowell 13110*).

Tabebuia savannarum Britton, sp. nov.

A small tree, about 4 m. high, the twigs clothed, below the leaves, with linear, lepidote scales 4–5 mm. long. Leaves simple, oblong-obovate, entire, 1.5–3 cm. long, chartaceous or subcoriaceous, shining with impressed midvein above, dull, with prominent midvein and finely reticulated beneath, the petioles 4–5 mm. long; flowers few, on pedicels about 5 mm. long; calyx narrowly campanulate, 8–10 mm. long, 2-lobed, the lobes acute; corolla pink, about 4 mm. long.

Savannas near Camaguey (*Britton & Cowell 13202*).

Tabebuia Cowellii Britton, sp. nov.

A tree 7–10 m. high, the twigs stout, short, bearing several or numerous thick ovate to lanceolate scales 1–2 mm. long below the leaves. Leaves oblanceolate to oblong-oblanceolate or some of them obovate, coriaceous, 1.5–5 cm. long, finely lepidote, inconspicuously finely reticulate-veined beneath, retuse or rounded at the apex, cuneate at the base, the midvein prominent beneath, the petiole 3 mm. long or less; flowers few together or solitary; pedicels 3–5 mm. long; calyx narrowly campanulate, 5–6 mm. long, loosely lepidote, unequally 5-toothed, the teeth ovate; corolla pink, 4–5 cm. long; capsule linear, straight, 10–13 cm. long.

Hillsides and plains, southern Oriente, along the coast. Type from Conde Beach, Guantanamo Bay (*Britton 2132*).

COTEMA Britton & Wilson, gen. nov.

Trees, with 1–5-foliolate slender-petioled leaves, and rather large, long-pedicelled lateral or axillary flowers, solitary or few

together. Calyx cylindric-campanulate, irregularly 2–4-toothed. Corolla oblique, funnelform-campanulate, unequally 5-lobed, vertically flattened, its lobes reflexed. Fertile stamens 4, didymamous, exserted; filaments slender; anther-sacs reflexed; sterile filament slender. Capsule terete, elongated, curved or coiled. Seeds oblong, thin, winged at each end. [Name an anagram of *Tecoma.*]

About 4 species, natives of eastern Cuba.

Type species: *Tecoma spiralis* C. Wright.

Cotema spiralis (C. Wright) Britton & Wilson, comb. nov.

Tecoma spiralis C. Wright; Griseb. Cat. Pl. Cub. 194. 1866.

Eastern Cuba (*C. Wright 3038*).

Cotema woodfredensis Britton, sp. nov.

A tree up to 6 or 7 m. high. Leaves 3–5-foliolate; petioles slender, 2.5–5 cm. long; petiolules slender, 8–25 mm. long; leaflets subcoriaceous, obovate, the larger ones 5–7 cm. long, 2–5 cm. wide, all crenate above the middle, rounded or obtuse at the apex, narrowed or cuneate at the base, finely reticulate-veined and lepidote-punctate on both sides, shining above, rather dull beneath, turning dark in drying; capsule curved, greatly elongated, about 4 dm. long, beaked.

Rocky hillside, Sierra Nipe, between Piedra Gorda and Woodfred, Oriente (*Shafer 3320*).

Cotema apiculata Britton, sp. nov.

A tree about 5 m. high. Leaves 5-foliolate; petioles rather stout, 4–6 cm. long; leaflets coriaceous, dark green, elliptic to elliptic-obovate, 6–9 cm. long, 3–5 cm. wide, crenate, rounded and apiculate at the apex, obtuse or rounded at the base, strongly reticulate-veined and loosely lepidote-punctate on both sides, the petiolules 2–3 cm. long; peduncles lateral, solitary or 2 together, stout, 3–5 cm. long; calyx deciduous; capsule about 3 dm. long, 5–6 mm. thick, coiled or curved.

Edge of pineland thickets, between Rio Yamaniguey and Camp Toa, Oriente, at 400 meters altitude (*Shafer 4179*).

A barren specimen from Pinar de El Purio, Cabonico, Oriente (*Roig 134*), is referred to this species with hesitation.

Cotema holguinensis Britton, sp. nov.

A tree up to 8 m. high. Leaves 3–5-foliolate; petioles slender, 1–5 cm. long; petiolules slender, 2 cm. long or less; leaflets

firm-chartaceous, lepidote, elliptic to obovate, 2.5–6 cm. long, 3.5 cm. wide or less, crenate near the apex, or entire, obtuse or rounded at the apex, obtuse or subcordate at the base, reticulate-veined above and faintly so beneath, the primary venation rather prominent on both sides; flowers 2 or 3 together in lateral clusters; pedicels slender, 3–4 cm. long; flower-buds apiculate; calyx 1.5 cm. long; "corolla yellow"; capsule curved, elongated, about 2.5 dm. long.

Vicinity of Holguin, Oriente. Type collected between Holguin and Cacocum (*Shafer 1550*).

Family GESNERIACEAE

Gesneria yamuriensis Britton & Wilson, sp. nov.

A slow shrub. Leaves clustered near the apex of the stem, membranous, oblanceolate, 7–12 cm. long, 2.5–4.5 cm. broad, acute to acuminate at the apex, cuneate at the base, sessile, rugose, the veins impressed above, prominent beneath; inflorescence corymbiform, the peduncles axillary, many-flowered; pedicels filiform, 3–4 cm. long, glabrous or slightly pubescent; calyx-lobes linear, 1 cm. long, glabrous, the tube 10-ribbed, 4.5–5 mm. long; corolla scarlet, tubular, 3.5–4 cm. long, glabrous.

Coastal cliffs, Oriente. Type from face of cliff near Rio Yamuri (*Shafer 7786*). Related to *G. purpurascens* Urban.

Gesneria nipensis Britton & Wilson, sp. nov.

An erect shrub, 3–12 dm. high, the twigs, petioles and peduncles scabrous. Leaves coriaceous, oblanceolate, 6–11 cm. long, 1.7–2.7 cm. broad, acute to short-acuminate at the apex, cuneate at the base, dull and scabrous above, rufescent beneath, especially when young, faintly few-veined with the midvein impressed above and prominent beneath, the margin revolute, entire or slightly crenulate; petioles 1.5–1.7 cm. long; peduncles axillary, 6–8 cm. long, 2–3-flowered; calyx-lobes lanceolate, 3 mm. long; corolla tubular, yellow, 1.5 cm. long, verrucose; capsule narrowly obovoid, ecostate, 8–9 mm. long, 5 mm. broad, finely verrucose.

Wet shady woods. Type from Sierra Nipe, near Woodfred, Oriente (*Shafer 3201*).

Gesneria clarensis Britton & Wilson, sp. nov.

A tall shrub with slender grayish-brown branches, the twigs and petioles minutely scabrous. Leaves subcoriaceous, obovate, 7–10 cm. long, 3–4.4 cm. broad, rounded or acutish at the apex,

broadly cuneate at the base, glabrous above, rufescent and minutely papillose beneath, the margin entire or serrulate; petioles 1–1.5 cm. long; peduncles axillary, 1-flowered, together with the angled pedicel, 1–2 cm. long; calyx-lobes linear, 7–8 mm. long; capsule obpyramidal, 5 mm. long, prominently 5-ribbed.

Mountains of Santa Clara. Type from Sierra del Caballete, Sancti Spiritus mountains (*Léon & Clement 6504*).

Family LENTIBULARIACEAE

Pinguicula lignicola Barnhart, sp. nov.

An epiphyte, growing on twigs of trees and shrubs. Leaves numerous in a dense rosette, sessile, linear-spatulate, entire, about 1 cm. long, minutely glandular-hairy but otherwise glabrous, withering-persistent; scapes solitary or few, filiform, weak, 2–4 cm. long; calyx about 2 mm. long, the lobes obtuse, united to above the middle, the two lowest almost to the apex; corolla 1–1.3 cm. long, white, the lobes subequal, about as long as the tube, obtuse, overlapping, the spur at a right angle with the tube, less than 2 mm. long, saccate, obtuse; capsule not seen.

Oriente: Vicinity of Camp San Benito, February 24, 1910 (*Shafer 4031, type*); Camp La Gloria, December 24–30, 1910 (*Shafer 8065*); "La Yberia," a mining claim west of Baracoa, September 8, 1909 (*Charles T. Ramsden*).

Pinguicula benedicta Barnhart, sp. nov.

Leaves few or numerous in a dense rosette, sessile or nearly so, obovate to nearly orbicular, flat, entire, obtuse, 1–2 cm. long, minutely glandular-hairy above, glabrous beneath; scapes usually solitary, filiform, weak, 7–8 cm. long; calyx about 3 mm. long, strongly 2-lipped, the lips nearly distinct, the 3 lobes of the upper lip united to about the middle, the 2 lobes of the lower lip almost to the apex, all obtuse; corolla 2–2.5 cm. long, dark blue, distinctly 2-lipped, the 2-lobed upper lip much shorter than the 3-lobed lower one, the 5 lobes all oblong, entire, overlapping, the spur continuous with the tube, 0.5–0.75 cm. long, cylindric, obtuse; capsule not seen.

Oriente: Trail, Camp La Barga to Camp San Benito, February 22–26, 1910 (*Shafer 4025*, type); "La Yberia," a mining claim west of Baracoa, September 8, 1909 (*Charles T. Ramsden*).

Utricularia mixta Barnhart, sp. nov.

Stems slender, horizontal, submersed, free-floating except at the single point of attachment, up to 1 m. long, the older internodes 5–10 cm. long; leaves alternate, but forked from the very base and thus appearing opposite, each fork pinnately decompound with filiform segments, 10–20 cm. long, one fork usually much more copiously bladder-bearing than the other; mature bladders 1–1.5 mm. in diameter; scapes solitary, borne at alternating nodes, erect, 8–25 cm. long, very slender, less than 2 mm. thick, 6–12-flowered; scales none, or sometimes 1 or 2, like empty bracts, near the base of the raceme; bracts ovate, acute, 2–3 mm. long, concave and often sheathing the pedicels; pedicels 3–8 mm. long, at first erect but strongly recurved at maturity; calyx-lobes subequal, ovate, obtuse or acute, or the lower emarginate, about 2 mm. long, slightly accrescent and spreading under the mature fruit; corolla yellow, the upper lip subtriangular, emarginate, about 3 mm. long and broad, the lower lip rounded, truncate or slightly emarginate, broader than long, 5–7 mm. long, 10–12 mm. broad, the palate prominent, faintly 2-lobed, the spur conic-subulate, porrect, slightly shorter than the lower lip; ovules numerous; capsule spheric, 2–4 mm. in diameter, apiculate by the remains of the stigma; seeds by abortion few, 7–10, flat, peltate, winged all around, large for the genus, the body lenticular, about 2 mm. in diameter, the wing up to 0.5 mm. wide.

Type collected on muddy borders of a lagoon, Vivijagua, Isle of Pines, February 28–29, 1916 (*Britton, Britton & Wilson 15014*).

In quiet water, Santa Clara, Pinar del Rio and Isle of Pines; distributed by Wright as *U. foliosa* (*2895*) (true *U. foliosa* is *Wright 2895a*, distributed as *U. foliosa oligosperma*); Colombia; Brazil.

Family ACANTHACEAE

Tubiflora Shaferi P. Wilson, sp. nov.

Leaves basal, oblanceolate, runcinate-dentate, 2.5–5 cm. long, 0.8–1.3 cm. wide, deep-green and more or less densely pilose, especially when young, short-petioled; scapes 3–6 cm. long, slender, clothed with appressed, imbricated, acute, scale-like leaves 3 mm. long; spikes 1–2 cm. long, the bracts ovate, rigid, 3.5–4 mm. long, 1.8–2 mm. broad, obtuse or acutish at the apex, not keeled on the back, ciliate, appressed-pilose above within.

Pinelands, Sierra Nipe, near Woodfred, Oriente (*Shafer 3562*).

Family RUBIACEAE

Machaeonia minutifolia Britton & Wilson, sp. nov.

A shrub about 2 m. high, the twigs spiniform, slender, sparingly leafy, finely pubescent when young, soon becoming glabrous, the old branches stout, light gray. Leaves elliptic or suborbicular to elliptic-obovate, somewhat conduplicate, 1–2 mm. long, ciliate, rounded at the apex, very nearly sessile; flowers glabrous, sessile or very nearly so in the cymes; calyx-lobes rounded, about as long as the tube; corolla white, about 1.5 mm. long, its lobes obtuse; style about as long as the calyx-lobes; stigmas 2, short.

Palm barren, between Camaguey and Santayana (*Britton 2397*).

Scolosanthus lucidus Britton, sp. nov.

A shrub about 1 m. high, with slender, terete, rough-puberulent, resinous branches. Leaves ovate-orbicular, coriaceous, 8–13 mm. long, shining, nearly sessile, mucronate at the apex, rounded at the base, dark green with the midvein impressed above, dull green with midvein somewhat elevated beneath, the lateral venation wholly obscure, the margin revolute; calyx-lobes suborbicular, 0.8 mm. broad, minutely hispidulous; corolla not seen; fruit (immature) subglobose, 4 mm. in diameter, greenish.

Moa Bay, east of Rio Moa, Oriente (*Shafer 8355, type*); collected in the same region by Roig (*60*), and also collected in Cuba by Wright and mixed with *Scolosanthus Wrightianus* (*2660 in part*).

Psychotria Clementis Britton, sp. nov.

A shrub about 2 m. high, glabrous throughout. Leaves membranous, narrowly obovate or oblanceolate, 8–16 cm. long, rather strongly veined with the veins spreading-ascending, acuminate at the apex, cuneate at the base, the slender petioles 1 cm. long or less; stipules broadly lanceolate, acuminate, incised and ciliate, united below, about 8 mm. long; fruiting panicle corymbiform, about 7 cm. broad; fruiting pedicels 5 mm. long or less; fruit oblong, 7 mm. long, about 5 mm. thick, grooved, capped by the short calyx-limb.

Sierra del Caballete, Sancti Spiritus mountains, Santa Clara (*Léon & Clement 6522*).

Psychotria bermejalensis Britton, sp. nov.

A shrub about 2 m. high, the slender branches glabrous. Leaves elliptic, glabrous, rather thin, 5–10 cm. long, the veins dis-

tant, impressed above, prominent beneath, the apex acute or short-acuminate, the base narrowed or obtuse, the rather stout puberulent petioles 8–15 mm. long; stipules ovate, about 5 mm. long; panicles terminal, peduncled, 4–5 cm. long in fruit, glabrous; fruiting pedicels 2–5 mm. long; fruit globose, small, about 3 mm. in diameter, rather deeply grooved, red.

Between Yamuri Arriba and Bermejal, Oriente (*Shafer 8442*).

Psychotria moensis Britton & Wilson, sp. nov.

A straggling shrub, the twigs terete, puberulent when young, flexuous, rather stout, the internodes short. Leaves clustered near the ends of the twigs, subcoriaceous, oblanceolate, glabrous, 2–4 cm. long, 1.5 cm. wide or less, rounded or obtuse at the apex, cuneate at the base, rather strongly pinnately few-veined and with the midvein prominent beneath, very inconspicuously veined with the midvein impressed above, the stout petioles 1–2 mm. long; stipules distinct, about 4 mm. long, deciduous; inflorescence terminal, few-flowered; peduncle rather stout, 1–2 cm. long; fruiting pedicels about 5 mm. long; bractlets minute; fruit (immature) subglobose, a little longer than thick, about 5 mm. in diameter, the persistent calyx-tube about 0.5 mm. long.

Camp La Gloria, south of Sierra Moa, Oriente (*Shafer 8273*).

Psychotria toensis Britton & Wilson, sp. nov.

A shrub 3–9 dm. high, the slender brown twigs puberulent when young. Leaves lanceolate to elliptic-lanceolate, 2–5.5 cm. long, 0.7–2 cm. wide, acute to acuminate at the apex, cuneate at the base, glabrous above, the midvein slightly elevated, the lateral veins prominent; free tips of the stipules oblong, 2–2.5 mm. long, acute; inflorescence terminal, the peduncle 1.5–3 cm. long, puberulent; corymbs trichotomous, 1–1.5 cm. long, ebracteate; prophyllae oblong-lanceolate, 3 mm. long, 1 mm. wide, puberulent; flowers sessile; calyx-tube puberulent, the lobes triangular or triangular-ovate; corolla 12–13 mm. long, the lobes oblong to oblong-lanceolate, acute; fruit 4 mm. broad, contracted at the commissure.

Moist rocky places along trail, Rio Yamaniguey to Camp Toa, Oriente (*Shafer 4009*).

Mitracarpum Fortunii Britton & Wilson, sp. nov.

Annual. Stems branched at the base, the branches slender, erect, 6–9 cm. long, puberulent with incurved hairs. Leaves ob-

long, 6–10 mm. long, 2–3.5 mm. broad, acute at the apex, smooth or nearly so, obscurely nerved, sessile, the margin more or less revolute; corolla white, the tube about 1 mm. long, the lobes elliptic-ovate, about as long as the tube; capsule circumscissile.

Loma de Motembo, Santa Clara (*Léon, Edmund & Fortun 8601*).

Family CARDUACEAE

Aster Leonis Britton, sp. nov.

Branched, 3 dm. high, the branches slender, densely short-pubescent. Leaves finely pubescent and scabrous, those of the branches linear or linear-oblong, entire, acute or acuminate, sessile, 2–5 cm. long, those of the branchlets similar, much smaller; heads mostly solitary at the ends of the branchlets; involucre subhemispheric, 4–5 mm. high, its bracts linear-spatulate, ciliate, their green tips acutish; rays pink, about 1.5 cm. long.

Marshes, west of Batabano, Havana (*Léon & Cazanas 5753*).

Gundlachia apiculata Britton & Blake, sp. nov.

Shrub 1 meter high, resinous, the stout angulate stem branched above, tuberculate-strigillose, the branches erect. Leaves oblong-oblanceolate, 2.2–3.2 cm. long, 5–7 mm. wide, apiculate at the rounded apex, cuneate at base, alternate, sessile, coriaceous, entire, triplinerved and somewhat reticulate, punctate, more or less vernicose-resinous; heads about 4 in a terminal cluster, equaled by the leaves; disk turbinate, 5–6 mm. high, 3.5 mm. wide; involucre about 4-seriate, graduated, 4–5 mm. high, the phyllaries ovate-oblong, acute, appressed, indurated, scarious-margined, with darker subherbaceous glandular and glandular-ciliolate tips; rays about 2, white, oval, about 2 mm. long; disk-corollas about 4, sparsely pilose toward tip of tube, 4.8 mm. long, the tube 1.6 mm., the teeth 2 mm. long; achenes (immature) hispidulous, 1.5 mm. long; pappus dull white, 4 mm. long, the outer bristels shorter.

Camp La Gloria, south of Sierra Moa, Oriente (*Shafer 8053*).

Distinguished by its few heads and elliptic-obovate triplinerved leaves.

Gundlachia foliosa Britton & Blake, sp. nov.

Shrub, 0.3 to 1.3 meters high, somewhat glutinous, the stout erect striate branches tuberculate-strigillose, densely leafy, simple, or branched only in the inflorescence. Leaves obovate, 1.2–1.8 cm. long, 6–10 mm. wide, usually apiculate at the rounded apex, rounded at base, alternate, erect, uniform, sessile, coriaceous, tri-

plinerved, punctate, dull green both sides, glabrous; heads in dense terminal panicles of about 8 or 10, equaling or slightly exceeding the leaves; pedicels sparsely hispidulous, 1–2 mm. long; heads 6 mm. wide; disk turbinate, 6 mm. high, 3.5 mm. wide; involucre about 5-seriate, graduated, 5 mm. high, the phyllaries lance-ovate (outer) to oblong, acute to acuminate, appressed, indurated and scarious-margined with dark subherbaceous tips, sparsely glandular-hispidulous at apex; rays 2, white, oval, tridenticulate, 3.2 mm. long; disk-corollas 3, hispid-pilose at base of throat, 4.5–4.8 mm. long, the slender tube 1.5 mm., the lanceolate recurved teeth 2–2.5 mm. long; achenes oblong-cylindric, 5-angled, hispidulous, 2 mm. long; pappus dull white, 4 mm. long, the outer bristles shorter.

On dryish rocks, Camp La Gloria, across Sierra Moa, to Moa Bay, Oriente (*Shafer 8280*).

Readily recognized by its small crowded obovate leaves.

Gundlachia cubana Britton & Blake, sp. nov.

Low shrub, growing in clumps, branched, more or less resinous, the stem stoutish, densely tuberculate on the angles, densely leafy. Leaves narrowly oblanceolate, 1.7–2.7 cm. long, 2.5–4 mm. wide, acute, narrowed to the sessile base, alternate, coriaceous, entire, 1-nerved, punctate, glabrous, dull green; panicles terminal, sessile, about 8-headed, equaled or slightly exceeded by the leaves; pedicels 1 to 8 mm. long; heads turbinate, about 7 mm. wide; disk 6 mm. high, 4–5 mm. wide; involucre about 4-seriate, graduated, 4.5 mm. high, the phyllaries lance-ovate, acuminate, indurated, scarious-margined, the subherbaceous glandular-hispidulous and ciliolate tips somewhat recurved in age; rays 4, white, oval, 4 mm. long; disk-corollas 5, sparsely pilose at base of throat, 4.5 mm. long, the tube 1.5 mm., the teeth 2.2 mm.; achenes obovoid, densely hispid-pilose, 1–1.4 mm. long; pappus dull white, 4 mm. long, the outer bristles shorter.

Northern Oriente. Type collected by water near mangroves, mouth of Rio Yamaniguey (*Shafer 4255*).

Erigeron Taylori Britton & Wilson, sp. nov.

Diminutive, glabrous. Scapes filiform, prostrate or spreading, only 3 cm. long or less, monocephalous, bearing several oblong or oblanceolate scales about 1 mm. long; basal leaves tufted, spatulate, entire, obtuse or rounded, the blade 2–4 mm. broad, the slender petiole 15 mm. long or less; involucre 2 mm. long, its linear-lanceolate, acute or acuminate bracts reflexed in age and

persistent; receptacle foveolate; rays white; ligule linear, 1.6–1.8 mm. long; achenes ellipsoid-cuneiform, 0.5 mm. long, hirsute with short hairs; pappus about twice as long as the achene.

Upper Guama River, Sevilla Estate, near Santiago, Oriente (*Taylor 181*), forming moss-like patches.

Erigeron Earlei Britton & Wilson, sp. nov.

Loosely hirsute; stems solitary or few together, slender, erect, about 2.5 dm. high, few-branched above. Leaves membranous, the basal and lower ones spatulate or oblanceolate, 3–4.5 cm. long, obtuse or rounded at the apex, coarsely crenate, narrowed into margined petioles or sessile, or the lowest with slender petioles 1–2 cm. long, the uppermost oblong, acute, entire, 1–2 cm. long, sessile; heads several, slender-peduncled, the peduncles bearing 1–3 linear or lanceolate bracts 1–4 mm. long; involucre subhemispheric, 4 mm. high, its bracts in about 2 series, linear-lanceolate, acuminate, the outer ones pilose, somewhat shorter than the inner, all reflexed in age and persistent; rays white; ligule linear, 1.5–1.7 mm. long; achenes oblong-ellipsoid, 0.6 mm. long, hirsute; pappus 2–3 times as long as the achene.

Rocky river-bed, Hanabanilla Falls, Trinidad Mountains, Santa Clara (*Britton, Earle & Wilson 4843*).

Borrichia cubana Britton & Blake, sp. nov.

Shrub, oppositely branched, the stem and branches sparsely appressed-pilose, glabrate. Leaves opposite, the blades oblanceolate to spatulate-obovate, 3–3.8 cm. long, 5–11 mm. wide, mucronate-apiculate at the rounded apex, cuneately narrowed into the petiole, entire or sparsely spinulose-toothed below, coriaceous, obscurely triplinerved, canescent-lanate both sides; petioles narrowly margined, broadened and connate at base, 6–10 mm. long; peduncles terminal, rather sparsely appressed-pilose, thickened above, 5–7 cm. long; heads 2.2 cm. wide; disk subglobose, 1–1.2 cm. thick; involucre about 4-seriate, graduated, 8–9 mm. high, the outer phyllaries deltoid-ovate, acute and weakly mucronulate, with indurated base and spreading canescent-lanate apex, the inner broader, ciliate, otherwise subglabrous, with cuspidate-mucronate spreading tips about 2 mm. long; rays about 15, yellow, oval, 6 mm. long; disk-corollas yellow, slender, glabrous, 5.8 mm. long; pales similar to the outer phyllaries, broad, indurated, ribbed, with erect stiffly mucronulate tips about 1 mm. long; achenes quadrangular, black, glabrous, 3 mm. long; pappus a thickened angulate crown 0.8 mm. long.

Swamp near Atares Castle, Havana, June, 1917 (*Léon 7244*).

Nearest *B. frutescens* (L.) DC., but easily distinguished by its merely short-cuspidate outer phyllaries and pales.

Spilanthes montana Britton & Blake, sp. nov.

Shrub about 5 dm. high, sparsely dichotomously branched, the stem stout, angulate, densely leafy, the branches erect, the internodes mostly 4–10 mm. long. Leaves opposite, the blades lanceolate, 2.5–4 cm. long, 4–8 mm. wide, narrowed to an obtuse apex, cuneate at base, entire, coriaceous, slightly revolute, triplinerved, glabrous, shining above, duller beneath; petioles scarcely margined, 2–5 mm. long; peduncles terminal and axillary, monocephalous, glabrous, striate, 16–34 cm. long, sometimes bearing two spatulate denticulate bracts 4 mm. long below the head; heads discoid, subglobose to ovoid-subglobose, rounded, 6–10 mm. high, 9–10 mm. thick; involucre 3-seriate, slightly graduated, 5–6 mm. high, the phyllaries oblong or oval-oblong, rounded, denticulate-erose above, sparsely glandular-ciliolate below, thick-herbaceous with subscarious margin, papillose on back, obscurely nerved; disk-corollas white, 3.2 mm. long, sparsely papillose-glandular below, with short obscure tube; pales blunt, erose-denticulate above, papillose-glandular on keel throughout and sparsely hispid-pilose below; achenes (not quite mature) oblong-obovate, 3 mm. long, ciliate; awns 2, unequal, ciliate, 2–2.8 mm. long.

Top of Cajalbana, near the fall of the arroyo, Pinar del Rio, Cuba, April 6, 1915 (*Léon & Charles 4936*).

Related to *S. insipida* Jacq. and *S. pauciceps* (Griseb.) Blake, but readily distinguished by its densely leafy stems and lanceolate entire leaves.

Chaptalia comptonioides Britton & Wilson, sp. nov.

Leaves several or numerous, deeply pinnatifid, spatulate-oblanceolate in outline, 3–15 cm. long, short-petioled, obtuse or acutish, membranous, the upper surface dark green, glabrous or somewhat floccose, the under surface densely white-lanate, the ovate terminal lobe larger than the semicircular lateral ones; scape slender, floccose at least above, 2 dm. high or less; involucre subhemispheric, 9–11 mm. high, its linear bracts acute or acuminate, white-tomentulose with a green midvein; achene fusiform, minutely hispidulous, brown, the angles white, the filiform beak about as long as the body; pappus longer than the beak, pale brownish-white.

River-cliffs, Enseneda de Mora, Oriente (*Britton, Cowell & Shafer 12937*).

Chaptalia Shaferi Britton & Wilson, sp. nov.

Leaves 3–8 cm. long, lyrate or lyrate-pinnatified, short-petioled or sessile, obtuse or acutish, the terminal lobe much larger than the others, the upper surface dark green, glabrous, the under surface densely white-lanate; scape very slender, glabrous below, slightly tomentose above, 2 dm. long or less; involucre subcampanulate, about 5 mm. high, its bracts linear, acute, glabrous; achenes fusiform, minutely hispidulous, brown, the slender beak about half as long as the body; pappus longer than the achene, brownish-white.

River-banks and wet rocks, Oriente. Type from sandy bank of Rio Yamaniguey (*Shafer 4203*). Confused in C. Wright's collection with *C. stenocephala* Griseb., and with *C. pumila* of Jamaica.

Chaptalia Rocana Britton & Wilson, sp. nov.

Leaves several, membranous, spatulate-oblanceolate, 15 cm. long or less, repand-pinnatifid, crenate, or some of the smaller ones entire, acute or obtuse, dark green and glabrous or nearly so above, white-lanulose beneath, the petioles sometimes as long as the blades; scapes nearly filiform, 5–10 cm. long, floccose or becoming glabrous; involucre subhemispheric, 6–7 mm. long, its bracts linear, acuminate, glabrate; achenes (immature) filiform, minutely hispidulous, brown, the short beak less than one quarter the length of the body; pappus longer than the achene, brownish-white.

Mountains of southern Santa Clara. Type from stones in Rio Caracusey, Banao Mountains (*Léon & Roca 7904*).

The Correspondence of Schweinitz and Torrey

EDITED BY C. L. SHEAR AND NEIL E. STEVENS

(WITH PLATES 6 AND 7 AND THREE TEXT FIGURES)

INTRODUCTION

The two dominating figures in American botany during the early part of the nineteenth century were for more than a decade close friends and correspondents. Such of their letters to each other as are known to be extant, seventy-one in all, are here published practically entire, the only omissions being long lists of desiderata or accessions upon which no comment is made and which could be of use only to investigators working critically upon Torrey's or Schweinitz's herbaria, to whom the original letters are available. The letters are transcribed with but little alteration. Taken collectively, they furnish what is probably the most complete available record of the personal relations of these two American botanists.

Those who know Torrey only through his published work may be surprised at his early resolution to devote most of his time to the study of mosses, and no book-lover can fail to be amused at his good-natured irritation at paying "$18.02" freight and duties on a box which contained for him only one book—one which he could not read. There may be historic value too in the fact that even a century ago the zealous household broom was considered an "enemy of science," and it is apparent that as much consternation was then caused in the botanical fraternity when a leading botanist showed interest in mineralogy as is now aroused when a cytologist diverts toward plant breeding.

As fairly comprehensive biographical sketches are available (see Britton, 13; Gray, 25; Shear and Stevens, 77; and Thurber, 85), little biographical detail is introduced. The publication of the letters was made possible by the cooperation of three American scientific organizations and several individuals. Permission to publish the letters was generously granted by Dr. N. L. Britton,

Director in Chief of the New York Botanical Garden, Dr. E. J. Nolan, Secretary of the Academy of Natural Sciences, Philadelphia, and Dr. George de Schweinitz of Philadelphia. The letters from Schweinitz form a part of the Torrey correspondence preserved in the library of the New York Botanical Garden. Twenty-three of the letters from Torrey are in that portion of Schweinitz's correspondence which is the property of the Academy of Natural Sciences at Philadelphia and the remainder belong to Dr. Schweinitz. While the correspondence has not been preserved entire, the number of missing letters is surprisingly small.

In the work of editing, the writers have had the invaluable assistance of several of the members of the Torrey Botanical Club, particularly Drs. J. H. Barnhart, M. A. Howe, and A. W. Evans. The expense of printing has been borne by the Torrey Botanical Club as a tribute to the great botanist whose name it bears. The letters are published most appropriately one hundred years from the time the correspondence opened.

THE CORRESPONDENCE

The correspondence was begun by Torrey, a physician of twenty-three just beginning practise in New York City, asking assistance in the study of fungi of Schweinitz who, through the publication of a joint paper with Albertini (5),* had already established a reputation in the mycological field. The letter is addressed on the outside to The Revd. L. D. Schweinitz, Salem, North Carolina.

TORREY TO SCHWEINITZ

NEW YORK, Decr. 29th, 1819

Honored Sir

Having long desired the honor of your acquaintance & correspondence & having no other method of gaining it, I have taken the liberty of obtruding myself upon you without a formal introduction—thinking, that among those of mutual inclinations & pursuits, much ceremony is neither needed or expected. I have

* The list of the literature in the appendix was compiled by Miss Florence P. Smith of the Bureau of Plant Industry library. It is not a complete bibliography but is intended to serve for reference to the more important publications mentioned in the letters.

for several years past employed my leisure hours in the prosecution of the study of Botany & though I have some excellent company in the investigation of the higher orders of plants, in the study of obscure cryptogamous vegetables I am almost alone. The Fungi perplex me much, though it is not more than a year since I first attended to them with any success. Still I hope with the assistance I now entreat from you to study this difficult tribe of the vegetable kingdom much more effectually than I have hitherto done.

In the box which I have prepared for you, are some duplicates of Fungi which are sent to commence the correspondence I hope will be kept up between us. There is however, little inducement for you to attend to my communications. One who has so long attended to the subject, on which I solicit assistance cannot expect to receive much that will be interesting, from a *novice*. Should you nevertheless see fit to notice what I have sent, I should consider it a very great favour to have the names of the different species returned according to the numbers annexed to them. If a continuation of such communications would not be unacceptable to you I shall take the liberty to trouble you again ere long. A great number of species of Fungi have been observed by me in this vicinity, besides those now sent. A considerable part could be tolerably preserved, though many are of such nature that they cannot be dried. Of these—drawings or casts can be sent if desired.

I have found a species of *Phallus* which I suppose also grows near you, that I suppose to be *P. impudicus* of Muhlenberg's Catalogue [52]. It is however different from the *P. impudicus* figured in Sowerby [82] &c. in having an *indusium*. The *P. indusiatus* of Pers[oon] resembles it in some respects, though it is probably distinct from this. If you know which species I refer to I will thank you for your opinion respecting it.

If I had known whether you are fond of the other branches of the Cryptogamia I should have sent specimens. I am exceedingly fond of the Musci & Hepaticae & can let you have those which grow here, if you wish them. Also rare Phaenogamous plants.

I am very desirous of increasing my collection of American plants, particularly of Cryptogamia, & if I could offer you any

thing that would be a sufficient return for those peculiar to the South, I should solicit you to send me specimens—Perhaps you may know some other person, who may be more profited by it, willing to commence an exchange of plants with me. I should be greatly obliged to you for your *Monotropsis* if you have specimens to spare.

Please to let me hear from you soon, &
Believe me to be
Your obedt. & humbl Servt.
JOHN TORREY

REVD. L. D. SCHWEINITZ
P.S. March 14th 1820

Owing to adverse causes, I have been unable to forward the box before this,—I have now put it into way by which I hope it will reach you in good season—

Please to let me know whether you wish specimens in any of the other departments of Botany—

J. T.

SCHWEINITZ TO TORREY

SALEM N. C. STOKES COUNTY
June 24th, 1820

JOHN TORREY ESQR. New York
Honored Sir

You can scarcely form an idea of the agreeable surprise I experienced a few days ago on the unexpected arrival of the Box with fungi &c. which you have done me the honor to address to me. Opportunities for scientifical correspondence—more especially in a province of Natural History so utterly disregarded by most persons as are the Fungi, offer so rarely that I cannot express sufficiently the pleasure your kind letter gave me—nor pretend to thank you as I ought for the kind offers it contains. I embrace them with the utmost joy & hasten to assure you thereof by these lines, begging as a great favor the continuance of your correspondence. I should have immediately reloaded the box with specimens of Fungi &c. & sent it on to you—if I did not think it better first to comunicate to you what I can supply you with in order to avoid unnecessary things being sent. I shall therefore proceed in the first place to explain the different Lists contained in the inclosed sheet.

The first list, I, contains the names of all plants (excepting Cryptogams) growing within my reach as far as I have observed them, which I do not find in the Catalogue of New York plants [Torrey, **86**] you so obligingly enclosed (for which I beg to express my most cordial acknowledgements). If you will please to mark in your next which of these plants I can serve you with, I shall certainly send such of them as I have in duplicate as soon as possible & take measures to procure those which I have not by me for a future remittance. Other southern plants, not immediately in our reach I may possibly be able to procure for you thro' my southern friends. The second List, II, contains those plants of your Catalogue which are wanting in my collection (or at least American specimens of which I have not seen)—& I should consider it as a very great favor indeed if you could procure me any or all of them. The third List contains the names of the Fungi you have so kindly sent me. The names to which you find Nob. subjoined are of my own giving and are species which I had before observed here. No 49 [*Gyropodium* ? *coccineum* Nob. a new species*]. *Gyropodium* (a Genus I have ventured to make) *coccineum* is a species I have never found in Carolina but once observed in Pensylvania. The other species, *Gyrop. lutescens*, about six times as large is common here. No 91 [*Merulius minutissimus*, a new species—very distinct]. *Merulius minutissimus* is a beautiful new species. I think the name you give it very appropriate. No 95 [*Nov.* an *Sph*[*aeria*] *herbarum* denominand. This requires exam. by the compound microscope], found in your Herbar[ium] is a very interesting fungus entirely unknown. I shall submit it to a full examination under the great microscope as soon as I can. No 107 [*nov.* too indistinct to determine] is an extremly remarkable thing, but I can't make anything of it. Does it revivify? May it not perhaps be some morbid affection of the Fern on which it grows? No 108 [nov. *Isaria antheriformis* Nob. nov. spec.]—I have called *Isaria antheriformis* but should like to know on what you found it & whether it was in a fresh state just as it is now. I think it a very curious thing worthy of being closely examined. No. 62 [*Craterium clavatum* Nob. *Morchella esculenta*], was double, the one the *Morchella*, the other a young

* [The portions in brackets are inserted from the accompanying list.]

specimen of my new Genus *Craterium*, allied to *Peziza*. It grows with us to an enormous size changing from its *Clavaria* form to a remarkably shaped deeply turbinate *Peziza*. Some of the Specimens were rather indistinct. To these I have subjoined a (?).

In answer to your enquiry concerning the *Phallus* you have found I beg leave to observe that I have only once met with a *Phallus* here (altho I believe it not very rare but easily overlooked & requiring a wet season at a particular time, which generally with us is a dry one) & that in its ovular state. But this one was doubtless the same as yours for it had an indusium tho' otherwise quite similar to the *Ph. impudicus* of Europe. I could not determine it specifically on account of the young state. The later mycologists of Germany call the *Phalli indusiati—Hymenophallus*—a new Genus & I am confirmed by your observation in supposing this American species one not yet described; but I believe the *P. impud[icus]* of Muhlenberg is a different one & the same European *Phall[us]* as my friend the Rev. Jacob Van Vleck informs me, that he has seen the Europ[ean] *Phall[us] impud[icus]* in Pennsylvania. What is the *Phallus coccineus* of your Catalogue? It is not a *Clathrus* I suppose? Mr. Leconte once sent me a drawing of the *Clathrus* from Georgia.

Having now answered your letter & added that you cannot possibly do me a greater favor than by continuing your communications of plants & fungi I shall beg leave to give you some information concerning my botanical labors & collections, in order to enable you to judge wherein I could serve your wishes.

When I first came to Carolina I almost exclusively attached myself to the Fungi & formed a considerable collection now amounting to about 1500 Species, entirely from our immediate neighborhood, which still keeps increasing. Of these rather upwards of 1100 Species are identical with European ones, the rest appear to belong exclusively to our continent many of these necessarily, from being parasitical on merely American vegetables: others may probably occur in Europe likewise, as it is but of late that the Fungi have been closely examined there. Of the preservable ones I have with few exceptions preserved specimens in my collection (the *Agarici* &c. except the *Pleuropodes* I exclude entirely because altho' they may be dried they lose all their characteristics.

& try to make drawings of such as appear new) & at the beginning of this year I have commenced an augmentation in such a manner, that I have 5 parallel collections as complete as I can obtain specimens in order to send to friends who wish to have them. Please therefore to let me know what species you have firmly established & I shall send you specimens of all the rest of mine of which I have any—for I don't like to send such as you are already sufficiently acquainted with, as these may be wanted by some other friend. My catalogue of Fungi, together with descriptions of all the new species by me established & specimens of them, I took with me to Europe on my visit there in the year 1817–18 & left them in the care of Dr. Schwägrichen at Lipzic to make use of them at his discretion [75]. Since my return, having provided myself with instruments & books I have pretty zealously turned my attention to the Musci, Jungerman[niae] & Lichens & sweet water Algae, & have succeeded in determining a considerable number. Especially Lichens & Musci hepat[ici] we are rich in. I have found above 300 species of the former, & about 50–60 of the latter. Of all these (or at least of most of them) I have duplicates & am continuing their collection, so that you can get them as soon as arranged & separated which however cannot be done on account of my avocations of duty before the end of next winter. What has been of great service to me was the happy circumstance that I succeeded in procuring from Dr. Schwägrichen & other botanists of Germany specimens of the greater part of the German musci, hepat., Lichens, & all their [sweet] water algae—by which I am greatly aided in determining our plants. In the mean time I have not neglected the Phaenogamic plants. My German friends liberally furnished me with the greater part of those growing on the continent & I have added a considerable number of the American ones, so that my Herbar[ium] which I have arranged handsomely & convenient, now contains, includ[ing] Cryptog[amia], near 6000 plants altogether from their native soil either of Germany & England, or America. Lately I have conceived some idea of preparing an English & Latin work on the Cryptogamia of the United States or of North America generally & you can therefore judge how much I wish that botanical Friends like yourself would aid me by communicating

Specimens of Cryptogamists of America generally. The catalogue you sent me is rather deficient in these, but I presume you have a collection that contains more species. In my next I will try to send you a Catalogue of all my American Cryptogamists; but in the mean time you will greatly oblige me by any you can spare. Does the Sea in your vicinity afford any variety of Fuci & Confervae? This division is naturally entirely out of my reach except by the kindness of friends; my European specimens are pretty numerous—& I have about 25 species of sweet water Algae here & hope to find more. Mr. Elliott has sent me lately a fine collection of South Carol. Fuci &c. Can Decandolle Species Plantar. [15] be procured in New York & what is their price?

Any parcel you wish to send me reaches me safely when addresed to Mr. John Jordan, Philad[elphia], or Jacob & A. Ritter, Philadelphia. The latter address I prefer because Mr. Ritter more frequently sends goods hither. I would thank you to favor me with your address more particularly. I shall certainly send a specimen of my *Monotropsis* (sit venia nomini barbaro, while Nuttall has not mended the matter by my own still more barbarous name) with my first remittance to you. Accept, dear Sir, my hearty thanks for the favor of your correspondence & let me indulge the hope that you will continue it & thus oblige

Your most obedt Servt

LEWIS D V SCHWEINITZ

By the Rev. C. F. Denke lately established in our vicinity the botanical fraternity of North Carolina has obtained a valuable recruit & now forms a quadro. Rev. Jacob Van Vleck, C. F. Denke & myself here, & Prof. Mitchell at Chapel Hill. I am afraid there is no other soul in the state. When you do me the honor to write pray let the letters be directed to R[ev. Mr. Schweinitz,*] Salem Stokes County North Carol[ina], & put them into the mail at New [York*]. They reach me much sooner than by inclosure to Philadelphia. I would [ask*] you to inform me where my friend Mr. John Leconte is at present.

Your *Gratiola neglecta* gave me much pleasure; I had observed it here this year & had made out the same name for it, a coincidence

* [Words supplied by the editors, the letter being torn.]

trifling in itself but I can't help liking such trifles as omina fausta! Looking over your letter I can't help remarking upon the epithet "difficult" which you attach to the study of the tribe of Fungi. I am of opinion that it is by far the easiest of the Cryptogamic divisions. The species are much more characteristically divided & when once you have a considerable number in your mind you will rarely be at a loss. Wherever there are a considerable number of varieties attached to some species among the Fungi they almost always partake so strongly of the specific characteristic that they rarely occasion doubt.

TORREY TO SCHWEINITZ

NEW YORK July 29th 1820

Respected Sir

Your highly interesting letter of the 24th of last month I received after much patient waiting. I had begun to fear the box I sent you had miscarried, but I was agreeably disappointed at finding it had not only reached you in safety, but that my numerous queries were so satisfactorily answered. I exceedingly regret it is not in my power to be a more useful correspondent to you, but if I supply some of your desiderata it will amply satisfy me for what little trouble it may occasion. I shall take a particular pleasure in sending you not only all the *fungi* I can procure but specimens of all other cryptogamous & phaenogamous plants of which I can procure duplicates. As I am a young man & engaged in the practice of physic it is impossible for me to pay much attention to the study of natural history. However, by oeconomising my time I hope I shall, in time, accomplish something. Besides I have an extensive correspondence with all the botanists of the Northern States who supply me with every thing not growing in this vicinity, so that with the assistance of my friends my correspondence may not be altogether useless to you.

You would do me a particular favour by furnishing me with your specific characters of the Fungi you consider new among those sent to you as you probably described them in a fresh state. I was a little surprised that there were only *two* species of *Sistotrema*—they perplexed me as much as any others of the Fungi. The *Isaria antheriformis* I found in my herbarium,

in a part which had accidentally got wet. That other little fungus which I found in my herb[arium] I hope you have by this time determined—Do let me hear from you on the subject in your next letter.

The *Phallus* having an indusium, is quite common here some seasons & always has the indusium very distinct. When it appears again I shall prepare a specimen according to Withering's process & send it to you. The other species which I call *P. coccineus* is figured by Sowerby in his 3rd Vol. of Eng[lish] Fungi [82]. —It may not be a real *Phallus* though I suspect it is the species meant by Muhlenberg who has a *P. coccineus* in his Catalogue [52]. Your desiderata from my Catalogue [86] I shall take the earliest opportunity of supplying, & as I collect sufficient to make up a package it shall be punctually sent to you.

For your kind offer to send me such plants as grow in your vicinity & which are not in my Herbarium I return you my sincere thanks, & any of those in your list except those enumerated on the next page would be highly acceptable to me.

Several of my botanical friends have expressed a desire to enter into a correspondence either with yourself, Mr. Denke, Mr. Van Vleck, or Professor Mitchell, but as I shall send you everything from this region & they have free access to my collection, perhaps it would be better for them to communicate with either of the three latter gentlemen, as we should then receive among us a greater variety than perhaps you yourself would take the trouble to send. Mr. Cooper, a young gentleman of leisure & fortune of this city, who devotes most of his time to study has put into my hands to be transmitted to you (he being now absent from the city) a small package of plants which you can dispose of as you think fit. His letter which accompanies his package will explain his views. Mr. Halsey—another young but accurate botanist, wishes me to send a package on his account. In my next remittance to you I shall put up duplicates of such other cryptogamia as I possess duplicates of, & also such phaenogamia as you want & I can supply you with. I hope you will take the earliest opportunity of forwarding to me some of the plants I desire, & do, if possible, put up a few cryptogamia. Respecting the Fungi I have collected, & which you wish me to furnish you with a list

of, I would remark, that my knowledge of this tribe of plants is so limited that if I were to draw one up it would only mislead you. Please therefore to send me almost anything not in the catalogue of New York plants [**86**], & not in the collection I sent to you—especially your new species.

I am making great exertions to extend my collection of foreign cryptogamia & I have already a great many species. Profs. Sprengel, Treviranus, & Agardh have sent me fine collections, & so has Mr. Casström of Stockholm, Mr. Sealy of Cork, &c. With the aid of these I study the species of this country with more satisfaction than I otherwise could, but still I labour under considerable difficulty for want of books. I want Schwägrichen's supplement [**66**] & many other books. Agardh informs me he has finished his Species Algarum [**3**]. I would wish to know whether the Supplement to Persoon has ever been published. The *Synopsis* [**59**] is now becoming antiquated.

Any plants in your list No 1 except these below (which I already possess) would be highly acceptable
[Lists 88 species]

I rejoice to hear you [say] that you have turned your attention to a work on American Cryptogamia. I hope nothing will occur to prevent what is now so great a desideratum. It is really a reproach to our botanists that none of them except Dr. Muhlenberg ever attended to this interesting department of Botany. Should the Flora Lancastriensis[*] ever be published we shall have much assistance in the Orders of Musci & Lichenes, though the *Father* of American botany did not neglect the other families.

Mr. Nuttall [**55**] seems to hint that Mr. Collins will publish something on the Cryptogamia of this country (in his preface). But I think it is very doubtful as this gentleman carries his *caution* so far that it is difficult to get his opinion on the most common

* [Youmans, W. J. Gotthilf Heinrich Ernst Muhlenberg. Pop. Sci. Mo. **45**: 693, 696. 1894. Reprinted in Youmans, W. J. Pioneers of science. . . . New York. 1896. "In July, 1785, Muhlenberg communicated to the American Philosophical Society an outline of a Flora Lancastriensis (flora of Lancaster) containing the results of his own observations on the plants and their habits. . . . Unfortunately they have not been published." A list of the plants described in this manuscript was, however, published by the Society (Trans. Am. Phil. Soc. **3**: 157–184. 1793).]

plant. I have sent him, repeatedly, packages of plants for examination, but he never answered me a word respecting them—

Do let me hear from you soon, & Believe me to be

Your obed. servt

JOHN TORREY

P.S. I shall dispatch for you to Mr. Ritter's care, Phil. in a week, or ten days—Mr. Le Conte is in this city but attends little to Botany as the duties of his office occupy all his time.

SCHWEINITZ TO TORREY

SALEM October 22d 1820

Dear Sir

Your highly esteemed letter of July 29th reached me in due time & gave me the most sensible pleasure. I should undoubtedly have answered it on the spot, had I not wished to accompany it directly with a box containing some of those plants &c. which you desired from me, which I found no leisure to get together before this. I now however have the pleasure to inform you that I have made up a box for you, which is to proceed on to Philadelphia in a week or two, the contents of which I shall beg leave to specify below. Your kind offers of providing me with what I still want in my collection are exceedingly acceptable; especially as you can perhaps procure for me northern plants from other Botanists, even should they not grow in your vicinity. With a view to point out such I beg leave to inclose a list of such as I had some time since made out—which however contains numbers of those that are included in your Catalogue [86]. I need not add that it will be a great pleasure to me to serve you & your friends with everything I can command.

Your request as to specific characters of the new fungi sent me by you I shall gladly comply with, but must beg your indulgence in that respect & with regard to further communications of fungi till towards Spring as it will take me nearly all the winter to arrange & describe what I have on hand.

I have since the receipt of your letter had the good fortune to find both the *Phallus coccineus* (as I take it to be—tho' not possessed of Sowerby's Fungi [82]—a *Phallus* beyond all doubt—I have made a drawing of it) & the *P. impudicus* (non indusiat.).

My friend Rev. J. Van Vleck altho very zealously attached to the study of botany is on account of his age no longer able to collect plants. But Mr. Denke on the other hand, with whom I have planned for the next year two excursions into our southern mountains—promises great activity & I hope thro' his means chiefly to be enabled to procure for you, Mr. Cooper, & Mr. Halsey, from whom I have received a letter which is answered by the enclosed & by a little package contained in your box, & other friends everything that we can get at. I was not a little pleased to find that you correspond with so many of the European botanists—especially with Agardh in Stockholm whose Species Algarum [3] I most earnestly desire to procure & beg you to let me know what is the title in full. Perhaps you may be able to let me have some European Cryptog., if you are supplied with duplicates—& I shall try to communicate to you occasionally a list of those I possess in order to see whether you can do so. No supplement to Persoon [59] has ever been published to my knowledge. But a most excellent work on the Fungi by Nees von Esenbeck [53] (barring the nonsensical metaphysics which pervade the reasoned part of it) full of the most accurate observations & truly deep reflexions entirely in the German language is in my hands, which will be of great advantage. There is a volume of Copperplates belonging to it which renders the book pretty dear. I am now anxiously expecting the box you have sent on to me, by the return of the waggons which take the one I send you to Petersburg. It would be a fine plan to keep boxes continually under way in this manner. Should you have opportunities to send on directly from New York to Petersburg in Virginia Addressed to Caldwell & Orr it would greatly facilitate the business (giving me notice as often as you have sent them a box) & if you in that case would so desire it, it would perhaps be equally advantageous for me to order what I can send you directly from Petersburg for New York. My project of writing a work on Am. Cryptog. will depend much on the contributions I may receive from others. I am sorry to observe that not all American botanists are as free as yourself in comunicating their observations—which I cannot comprehend—it always being my greatest pleasure to do so. I now advert to the contents of the box I have made up to you it contains 1) 237 Phaenogamous plants

such as I conceived by your directions would be acceptable and as I had on hand. 2) a number of Fungi that I had put up for the purpose collected before this year. Of both I have retained lists, so as to know what I have already sent you, when again able to make up a packet. The following is a list of the Phaenogamous plants. [The list of 237 flowering plants is here omitted.]

These are put up in paper at the bottom of the box, & labeled with the names under each plant.

The fungi are wrapped up separately in papers & the name written on. Some of them probably were among those you sent, but as they are not many I did not take the trouble to pick these out, as this collection was made up before I received yours. My next box will contain a good number of Fungi which remain to be assorted & I shall take care to send none of those you have already. By my list the present collection contains [the list of 198 fungi is here omitted].

I am apprehensive that some specimens of the Fungi will not be distinct enough. In that case I shall always be ready upon your naming them (except where this indistinctness arises from the difficulty of preserving them) of sending you better specimens if I can get them. It is pretty troublesome to preserve them properly—as to the Agarici & Boleti of soft texture & other similar ones I have never made an attempt—but chiefly made drawings of them.

You will no doubt be so kind as to hand the inclosed packet & letter to Mr. Abraham Halsey, & if Mr. Leconte is still at New York you will oblige me much by letting him know that I wrote to him at some length a good while ago requesting his directions concerning the copying of my Fungi, but have not received an answer. I remain with the greatest respect

Your most obdt Servt

LEWIS D v SCHWEINITZ

P.S. I just observe that the *Tuber cibarium* is among the Fungi in your Catalogue of N. [Y.] Plants [86]. I have never seen that, altho I have looked for it with great pains—if you can send me some specimens it will oblige me very much.

SCHWEINITZ TO TORREY

SALEM January 11th 1821

DR TORREY New York

Dear Sir

With a confident hope that the box of plants which I addressed to you has by this time arrived (having had news of it as far as Philadelphia) & given you some little satisfaction, I beg to express to you the extreme delight the receipt of your Package of plants shortly after mine were sent off gave me, together with those sent on by Mr. Wm. Cooper to whom I shall write a few lines today.

I should have written to you in answer earlier than this day, if I had not thought it would be more agreeable to you to receive my list of the delightful quantity of Cryptogamists included—which required time to be examined. I now have the pleasure of subjoining that—& have succeeded in determining them all—with the exception of a very few that were either too indistinct or which I had the misfortune to lose by their dropping into a heap of rubbish as I was going to examine them—from which they could not be extricated. Altho' I was extremely gratified by the Phaenogamous plants you have so kindly sent me, & earnestly beg you will be so good as to continue—still I must confess I was still more delighted by so fine an assortment of Cryptog. especially of Musci. Those arrived in excellent time just as I was commencing a thorough examination of my whole collection, & of a good large bag of Mosses collected in Canada by my friend Mr. Denke—so that I believe I can say they have been pretty well ascertained; it is of great importance in the exam. of Musci, that you should have as great a number together as possible. The results of my labors on the Musci frondosi et Hepatici has been the following.

I find mention made in Authors of Musci frond. 276 Species American ones including a number which I have found, not heretofore mentioned as American & a very few new ones established by me.

Of these I possess 263 from America so that I at present only lack 13 species of hitherto described Am[erican] Musci frondosi & of these there are only 4 species which are not in my collect[ion] fr[om] Europe.

Musci Hepat. 76 Species recorded or found by me, of which some are new. Only two of these are not in my American collection.

The whole number
of Musci Frondosi in my Collection is 442 species
of ----- hepatici ---------- 98 -----

Of both Frondos & Hepatics I have put up for you specimens of all of which I had duplicates—that are not mentioned in the New York Catalogue or among those you sent me, besides a considerable number of European ones from my duplicates which are always distinguished by being in blue paper.

I am now on the point of reviewing my Lichens in the same manner. I have 562 species in my collection of which no less than 441 are American ones. When I have finished this work I shall have about sufficient to send on another box to you. The way which we have begun of thus communicating specimens of Cryptog. is the only one I believe which will enable us at length to get a competent knowledge of the immense numbers of Am. Cryp. plants—& I therefore earnestly solicit you to send on in the same manner, whatever you think proper to communicate to me. I shall always send you back a similar list, with the one here inclosed--containing my opinion on all the spec. communicated.

I think I have mentioned to you my idea of publishing a Cryptogamic Flora of N. America. I am now in communication with a printer at Raleigh for publishing a specimen of such a work [74], which I intend shall contain the Musci hepatici, on account of their limited number. My plan is that such a work should be as a kind of second part to Pursh [61], & therefore modelled upon his plan; & the specimen I intend to give will enable scientific friends to judge whether that be a good plan. My only fear is the size of the work—for imperfect as my present collections are the whole already amounts to a very large number, Fungi 1700, Lichens 441, Musci, 352, &c. &c., so that it must comprise near 2500 species. Besides I should not pretend it to be anything besides a Prodromus, for the purpose of calling the attention of Am. Botanists to this part of the Science. Our higher mountains, & our southern swamps & seaboard must necessarily contain immense numbers of Crypt. plants hitherto quite overlooked. I am preparing for an

Louis D. Schmitz

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expedition to the Grandfather mountain this spring, chiefly with a view to Cryptog.—but unhappily have little prospect of being able to get into our famous Dismal swamp &c. of whose fertility I have a still better opinion especially in M. frond. & hepat. Can you procure me information as to where Mr. Nuttall now resides? I wish much to become acquainted with him, & to propose some questions to him concerning the Crypto. of the Western country.

This year I shall exert myself together with Mr. Denke in collecting all Phaenog &c. plants which our neighborhood contains in order to be able to meet the wishes of you, Mr. Cooper & Halsey (this latter gentleman writes me that he has sent on a parcel for me which however has not yet arrived). I intend to send you a copy of my list of Am. plants generally not yet in my collection—hoping that you might perhaps procure some for me, not growing in your vicinity, by perhaps receiving duplicates from others. The small list now inclosed by Right Rev. Jacob Van Vleck designates such of your Catalogue as he would be glad to procure—& on the other page I repeat to you a more correct list of those which I myself should be glad to receive from your Catalogue, together with the few American mosses which are wanting in my collection. I hope you will find time shortly to let me know how the plants I sent you answered your wishes—With the greatest respect I remain Yours most Sincerely

LEWIS D v SCHWEINITZ

P.S. Do you think Dr. Silliman could give place in his excellent work [American Journal of Science, 6] to a short review of the Musci frondos of Am?

Musci frondosi Americani—non in Herbario LD v S. [Lists 13.]

What is intended by the *Hypn[um] cupressiforme* in your Catalogue? & *Hypn[um] setaceum* Whence is the name?

Targionia hypophylla—among the M. hepat. is said to be in America—have you met with it?

Revised List of Phaenog. &c. plants in New York Catalogue, wanted by me. [Lists 124.]

TORREY TO SCHWEINITZ

NEW YORK, March 22nd 1821.

L. D. SCHWEINITZ ESQ.
Salem, N. C.

Dear Sir

Although your highly acceptable letter has been received nearly two months it has not been in my power to answer you according to my wishes until now. I was desirous of making some observations on the very choice collection of plants you had the kindness to send me, & this required more time than I could, until lately, spare. Mr. Nuttall, who was on a visit to this city a short time since, examined the collection with me, & our observations I shall give you below. I wished also to have it in my power to give you notice of another box of plants which will be ready to send to Petersburg in two or three days.

I thank you sincerely for your remarks on my Cryptogamia & hope you have found sufficient among them to reward you for the trouble they occasioned you. You do not agree always with Sprengel to whom I have at different times sent many of the specimens I send you. You will see below in what you differ. Indeed this great diversity in opinion among equally great botanists almost discourages me from pursuing the study of the Cryptogamia. I often find as many different *names* given to the same plant as *persons* to whom I send it. Tis true *Tetraphis pellucida*, *Dicranum scoparium* & such *well marked* species are not in this predicament, but in the genus *Hypnum*, *Lecidea*, *Thelephora* &c. &c. I seldom find two botanists to agree on a name. With all deference however to the learned Professor of Halle, I often differ from him in opinion & would ask of you whether his sight does not begin to fail him.—I am not jesting.

It gives me great pleasure to hear that we are at last in hopes of having a Cryptogamic flora of the United States. You are probably in possession of a greater quantity of materials for this purpose than any other person in this country. I hope you are well acquainted with all the species which Muhlenberg mentions in his catalogue [52]. Did you correspond with him? He has some species whose names I can not find in my books. You may depend on receiving everything from me which will be of any assist-

ance in your work, & I believe you will then have all that has been observed in the States north of Pennsylvania. All the botanists here send me everything they collect; so that I can thus do for you a great deal more than I could do alone.

You enquire respecting Mr. Nuttall.—I mentioned just now that he had lately made a visit to this city, but he resides now in Philadelphia. Mr. N. returned last spring from another expedition up the Missouri, & into the Arkansas Territory. He spent the year 1819 there & discovered a great number of new plants—probably about 300 species. He is now printing his *Journal* [56], but his botanical discoveries [54] he is preparing to publish in the next volume of the American Philosophical Trans. of Phila. He found comparatively few cryptogamia, & all of them except the Ferns, he has given to Zaccheus Collins Esq., of Phil. This gentleman has undertaken to examine them, as Mr. Nuttall has not paid great attention to this department of Botany. I doubt much however whether Mr. C. will consent to have his opinion of the specimens published, even if he should give any opinion. It is surprising how exceedingly cautious this gentleman is in this respect; for the (perhaps) hundreds of specimens which I have sent him, he has never returned me the name of one—You had better however write to him, as he may send you *specimens* if he will not give you *descriptions* & names of plants. Mr. Nuttall found on the Red & Arkansas Rivers, *Pilularia*, & *Marsilea*, which have not before been observed in North America—I have duplicates for you which shall be sent soon.

I am very glad you are so much inclined to continue in correspondence with me and my friends—It will no doubt be in my power to furnish you with many northern plants that do not grow in this neighborhood, as I am in active correspondence with most of the botanists in this part of the country. I intend soon to put up a package for the Right Rev. Mr. Van Vleck & shall be happy to open a correspondence with him on Botany.

You ask whether Mr. Silliman would give place in his Journal [6] to a short review of the Musci frondos, of N. Am? I answer—undoubtedly & if you send it soon it will be in time for the next No. You can send it directly to him, & transmit it to my care—

Remarks on the plants you kindly sent me last fall:

Gratiola sphaerocarpa—Is this not near our *neglecta*?
Lycopus exaltatus. If this is really distinct from *L. europaeus* can it possibly be the plant described in the Fl. Graec. [Sibthorp, 78]? I have only seen the *Prod.* Fl. Gr. [Sibthorp, 79] & therefore cannot decide whether it resembles the *plate*. *L. europaeus*, with us, looks very much like your plant.
Carex gynandra we have here, & I could not make it out. I think I have several new ones.
Cyperus uncinatus has a very great range, for I have it from Vermont, Massach.—Connecticut & N. York—Perhaps it is *C. squarrosus* of India? You know it is the *C. inflexus* of Muhl.? *C. mariscoides*—of whom? Our *Mariscus cyperiformis* (*Scirpus! cyperiformis* Muhl.) is now called *Cyp. mariscoides* by Sprengel, but it is *not* your plant.
Houstonia longiflora, is *H. tenuifolia* Nutt. Gen.
Phacelia parviflora Nuttall thinks is not that plant, though he does not name it.
Viola eriocarpa.—Is it distinct from *pubescens*? *V. pub*[*escens*] β Nutt.?
V, ochroleuca, looks like *V. striata* Nutt. &c.
Thaspium actaeifolium. Is it possible this is the real *Ligusticum actaeifolium* of Michaux & which he found on the Banks of the St. Lawrence!?
Sesbania herbacea is *Trigonella americana* Nutt.

I find I shall not have room here to make any further remarks on your plants, & shall therefore proceed to give the differences between *your* names of my Cryptogamia, & *Sprengel's*. I shall say more respecting your plants at another time.

No 47 Herb. "Hyp. lutescens" *Schweinitz* is Spr. *H. populeum*.
53 *Cooley*. "cupressiforme" *Sw.*— is *incurvatum* Spr.
9 Herb. Dew. "hians" *Sw.* is "*salebrosum* Hoffm. v[ar.] *plumos*[*um*] Hedw." Spr.
H. 20 Dew. "oxycladon" *Sw.* is *salebrosum* Spr.
8 Herb. Dew. "confertum" *Sw.* is *imponens* Spr.
Hyp.—v. "commutatum" *Sw.* is *imponens* Spr.
Hyp.—q. "adnatum" *Sw.* is "*molle* Dicks." Spr.
"Hyp. curvifolium" *Sw.* is *H. cristacastrensis* Spr.
Lesk.—19 "L. sericea" *Sw.* is *Neckera cladorh*[*iza*] Spr.
No 78 "Leskea varia" *Sw.* is *Hyp. radicale* Spr.

Gymnostomium repens, at first sight, looks much like an *Orthotrichum*, & was mistaken by me for a species of the latter genus in an advanced state. Sprengel returned it as an *Orthotric.*—I believe *anomalum*. Do you not think *Anoectangium filiforme*, quite distinct from *A. ciliatum?* Bridel makes it a variety & Schwägrichen does not notice it. *Didymodon* I erroneously called *Dicranum rigidulum*, though I knew better. It is a variable species, at least in height, which may be the cause of its not always resembling the European *D. rigidulum*. Really I must own that I hardly think the moss you called *D. virens*, the same as the European specimens I have under this name.

My *Jungermannia nodifolia*, Sprengel calls *J. ciliaris!* & your *J. platyphylloidea* he says is *J. platyphylla*—by the way is not your name objectionable? Your *Blasia pusilla* he calls *Jung. pinguis*—You may think it presumption in me to differ in opinion from two such celebrated botanists as Sprengel & yourself, but this plant though I suppose it to be a *Jungermannia* seems to me quite distinct from *pinguis*. Will you examine it again? *Thelotrema cinereum* Swtz. Sprengel calls "*Pyrenula* (!) *enteroleuca**. n. sp."

"Evernia prunastri" *Sw.* is *Borrera furfuracea* Spr.

No. 152 Herb. Cooley "Cetraria lacunosa aut nova" *Sw.* Sprengel says is "*Nephroma resupinata β papyracea*"

"Cenomyce phyllophora" *Sw.* is *C. gonorega* var. *pleolepis* Spr.

In a letter I lately received from Prof Sprengel, in some remarks on some plants I sent him, he says—"Your fungus, no. 108, found in your herbarium has afforded me great joy, as this is a most rare plant which has been named by Willdenow, *Blandowia*. Its place is between Anthoceros & Targionia. *B. striata* W. Berl. Magaz.? *Cfr.* Micheli Nov. Gen t. 4, f. 5.—Laetitia singulari se afferit!" Now there is something I do not understand in all this, for I can not be mistaken when I say the specimen is the same which I sent to you, exactly as I sent it to Sprengel, called by you *Isaria antheriformis*. There is certainly no resemblance in it to either *Targionia* or *Anthoceros*, & is most certainly a fungus—It grew I think in the damp paper of my herbarium.

—— I have just received from the Author (Agardh) the 1st volume of the *Species algarum* [3]; comprising the Fucoideae. It is a valuable work.

The box for you which I shall probably put on board a Petersburg vessel tomorrow, contains nothing but Cryptogamia. There are 200 species of all orders. Very few are named altho' I think I have determined a good part of them. Mr. Eaton [20], who is writing a little work on Botany, took away into the country, 6 months ago, all my books on Cryptogamia, so that I have not studied scarcely any of the specimens I now send you *from books*. Some of them I think are new, & many have probably been sent before.

Very respectfully, I remain Yours &c.
JOHN TORREY

P.S. Please to send your opinion of the names of the Cryptogamia as soon after you receive them as convenient. I hope to receive the box which you mentioned in your last letter you was preparing for me. If it has not yet been sent off please to hurry it a little—I am very anxious to see it. Mr. Halsey sent you a package a few weeks since.

J. T.

SCHWEINITZ TO TORREY

SALEM April 19th 1821

DR JOHN TORREY New York
Dear Sir

At length I am able to forward to you a box containing the greater part of the Cryptogamical plants of every division which I had on hand—having been prevented from doing so sooner first by the uncommon season & then by a wish to enclose you a copy of my Specimen of Fl. Cryptog. cont. the Hepatic mosses [74]—of which however the printing progresses so slowly that I can no longer wait, as a good opportunity offers for sending the box. You may however depend on receiving a copy as soon as it is finished, & I should be glad if you could dispose of some for me, as I wish not to lose too much on the little work. This delay has however afforded me the extreme pleasure of receiving in the mean time your invaluable letter of the 22d of March, which I can now answer. But first I beg leave to say a few words concerning the plants I this day send to Petersburg for you, a complete list whereof the inclosed sheet contains.

I am extremely sorry that my collection did not afford more

perfect specimens of many & would be glad if you would note down such as on examination prove too imperfect in order to enable me to send better from the new collections making for the purpose. Among the Musci frondosi all those underlined in the list are European specimens. I have given you the names by which I designate the rest, according to my determinations, but will not be quite positive about a number—It is impossible to be quite certain until repeated examinations & comparisons have taken place. This remark I wish to apply particularly to the Lichens—some of which certainly ought to be revised. But the winter season, which makes that practicable, proved too short for the purpose this time. By next year I hope not only to be able to speak with more certainty but to communicate to you a number more. In the box you will find several envelopes directed to Mr. Abr. Halsey. They contain Lichens (the same species which I send to you altho not so many) which you will oblige me to hand to him. I shall now proceed to answer your highly agreeable and instructive letter—after expressing to you my sincere thanks for your observations, & for the promised Box of about 200 cryptogam. plants, which I hope to receive by the return of the waggon which brings my box for you to Petersburg—requesting you most earnestly to be so good as to continue & to send me all the Phaenogamous plants still wanting to my Collection agreeable to my lists sent on.

There is to be sure but too much truth in your observation concerning the great difference of opinion concerning certain Cryptogam. plants—I believe it arises chiefly from this circumstance, that many Botanists, & especially such as Sprengel (who by the by is rather noted for his superficiality in this respect) do not take the trouble really to investigate closely the specimens sent, but hazard an opinion at first blush without accurate comparison & examination; which is but too natural considering the minute exam. that is often necessary to be certain of the identity of any moss &c. I am far from thinking my determinations altogether free from this reproach—However as to the Musci you sent me—I took great pains & wherever I am mistaken—the smallness of the specimens may be an excuse. But I candidly believe that many of Sprengel's determinations ought not to be depended upon

on account of his inclination to make short work. Dr. Schwägrichen is certainly the more correct & accurate of the two & I intend to send to him all those of which I entertain any doubts. Below I shall try to discuss the observations you have made on the particular mosses. I am glad you seem to favor and encourage my undertaking of a Cryptogamic flora. I shall however not proceed to the execution before I have made larger collections & more accurate observations. Unhappily the death of Muhlenberg deprived me of the advantage of his communications. He had begun & about half finished a letter to me commenting upon my Musci & Lichens sent to him—& all my endeavors to regain possession of the specimens (it was the whole of my then collection, so that I do not know to which species his observations apply) after his death proved unsuccessful. He has a number of Species —to which Swar[t]z is subjoined in his Catalogue [52] of which it seems impossible to know what was meant but by examining his Herbarium—& a good many new Lichens too which he has named. Finding such to which his specific name might justly be applied I have hazarded to call them by the names found in his Catalogue altho' I have no means of judging whether those I designated thereby are the same with his, in hopes that I shall have an opportunty one day of personally consulting his collection. I should be loth to publish my intended Fl. before I have accomplished this purpose. All my endeavors to gain some knowledge thereof by writing to his son Dr. Muhlenberg & Z. Collins have hitherto been in vain.

I am particularly obliged to you for your communications concerning Mr. Nuttall & am extremely happy that he had an opportunity of seeing the plants I sent you. I have lately written to him & expect his answer. I think Mr. Nuttall's observations uncommonly excellent. His Genera [55] have given me more light than any other book—it is so evident from all his remarks in that work, that they are the fruits of real personal acquaintance with the plants in nature. I am delighted with the prospect of seeing his botanical discoveries published soon—but I sincerely deplore that his cryptog. specimens have been swallowed by that retentive gulph, Mr. Collins, going *into* whose cave so many footsteps may be traced & none coming forth! I have among the rest written to Z.

Collins more than once, but have never been blessed with an answer. I am much obliged to you for the promise of *Pilularia* & *Marsilea*.—Could you procure me specimens of *Psilotum*, *Acrostichum aureum*, *Vittaria*, & *Hymenophyllum*—I should be very glad indeed. If I can serve you with a good European Specimen of *Salvinia natans* I shall do so with pleasure.

Mr. Van Vleck wishes me to express to you his sincere thanks for your kind offer to send him plants from your vicinity. In the course of this year I hope to furnish you with spec[imens] of all not yet in your collect[ion] which our vicinity contains. The idea I had of writing a review of the Musci frondos. for Mr. Silliman's Journal [6] I have given up for the present on account of my imperfect knowledge & the increasing number. (So for instance I have lately discovered a new species of *Andr[e]aea* in great plenty on our mountains which I intended to send you—but forgot it, till the box was closed.) But I am preparing a monography of the genus Viola [68]—which I shall either send to you for Silliman's Journal or else try to get it inserted in the Philosophical Transactions. Is there a prospect that a volume of that work will appear shortly? I ought to do something of the kind to acknowledge the honor done me, by making me a member of that Society. I shall now give you my remarks on your & Mr. Nuttall's excellent remarks on the plants sent you—very earnestly begging you to continue them—for this is the only right way to acquire accurate knowledge.

Gratiola sphaerocarpa. I cannot think this your *neglecta* or that must be different from what I conceived it—my *sphaero[carpa]*—(tho' to be sure I was doubtful whether it is the plant of Elliott) is nearer *virginica* &c. a very large plant—what I took for your *neglecta* is very small & somewhat hairy—but I may be mistaken.

Lycop[us] exaltatus. I cannot conceive how I came to send you any plant by that name. I have none such—I find the only *Lycop.* marked as sent you in my list *Lycop. angustifolius* Ell. p. 26, which is certainly very different from *L. europ.* (of the latter Mr. Halsey has sent me a spec[imen] exactly like my European). The *angustifol.* has an entirely different habit—grows 4 feet high without branching & looks a little like *Leonurus cardiaca*.

Cyper[us] uncinatus (*C. inflexus* Muhl.) is not the *Cy. squarros.* of

India of which I have a fine specimen—the heads of the latter & spikes are not 1/10 the size—besides other remarkable differences. *C. mariscoides*—sent you—I now find is altogether misnamed—since I have found the true one which is your *Mariscus cyperiformis*—I do not know what to make of it, unless it be a *Mariscus*?

Houst[onia] longiflora—I am very glad to learn that this is the *tenuifol.* of Nuttall—it is one of our common plants which I neve paid any close attention to & called it by the name our old botany had given—I should be glad to get the true *longiflora.*

Phacelia parviflora. Muhlenberg always called this *Polemon. dubium*—& I think it suits Pursh's description well enough—but nevertheless it may be a new species. It grows exclusively on the sandy banks of our rivers—but there very common & in gardens becomes very large & an inexterminable weed.

V[iola] eriocarpa. I think is not dist[inct] from *pub[escens]* β Nuttall—but certainly from the *pubescens* of Pursh. It is common here—but the *pubescens* I never found here.

V. ochroleuca is certainly the *V. striata* of Nuttall—but extremely different from what I call *V. striata* Leconte, a species which is common here, but Mr Leconte tells me, that he has never seen it any where else. In my next remittance I hope to send you spec. of all mine.

Thasp[ium] actaeifol[ium]—I have very doubtingly named this plant so—but if not right—it is undoubtedly a new species—our most disting[uished] Umbellate. It frequently grows—10 feet high & spreads 3 or four wide. It is very common in May.

Sesb[ania] herbacea. I am extremely glad that you point out the true name *Trigonella am[ericana]* which it is beyond a doubt—I neglected that Genus in examining it—but it suits exactly.

Pray continue your remarks as soon as possible. Now concerning the Cryptog. plants which I named.

Hyp[num] lutescens Schw.—I believe ought to be ***populeum*** on re-examinat[ion].

—— *cupressiforme*—The *cupressif.* is extremely various, it is very possible that this may be *incurvat[um]*.

—— *hians* Sw.—This certainly is not the same with ***plumos[um]*** Hedw. & agrees with *hians* of Muhlenberg, unknown to me.

—— *oxycladon* Sw.—I think I was mistaken in this—& it probably is really *salebros*[*um*] Sprgl.

—— *contortum* Sw.—don't you think this differs from *imponens* as well as the one I called *commutatum* which is only a subspecies of *filicinum* Schwägr.

—— *adnatum* Sw. Sprengel calls *molle*—As I have seen neither besides your Specimen I may well be mistaken—but it appeared to me to suit *adnatum* very well.

—— *curvifolium* Sw. is certainly not *cristacastrensis* as you will see at first sight when you come to compare the *cristacastr.* which I send you—which corresponds perfectly with numbers of European specimens in my collect[ion] & is one of the most distinct *Hypna* in nature.

Leskea varia Sw.—this species was so called by Muhlenberg—& differs materially from *H. radicale*—the *L. sericea* Sw. I believe was a mistake—it may be *Neckera cladorrh*[*izans*]—

I am perfectly convinced that the *Anoectang*[*ium*] *filiforme* is specifically distinct fr[om] *ciliatum* [—] I dont think that Bridel & Schwägr. ever saw it.

I crave your pardon for the flagrant mistake I committed in calling your *Dicranum cerviculatum*—*D. virens*—I must have committed it by a slip of the pen—as it is in my collection by the name of *D. cerviculatum* & evidently agrees with numerous specimens of this from Europe—while it certainly as you observe, is very different from *D. virens.*

Your *J*[*ungermannia*] *nodifolia*—I think is evidently distinct from *J. ciliaris*—altho' allied—my barbarously named *J. platyphylloidea* (by which I wanted to express its near relationship to *platyphylla*) tho' certainly very near it—I find so regularly distinct by numerous marks recited in my little work that it ought to be separated. *J. platyphylla* both in Europe & here always inhabits trees & grows in remarkably arcuately reflected tufts,—*platyphylloidea*—on rocks clothing them often to a great extent—& but slightly reflected or not at all—I confess I have been very negligent in the composition of some of my names. How Sprengel can take what I have called *Blasia pusilla*—for *J. pinguis* I cannot conceive. It has no manner of resemblance with that—of which I have this year found the most beautiful specimens in full fructification with

peduncles of 2 inches long, emitted from the side of the leaves. Your specimens were however too imperfect to be certain of its being the *Blasia*—however they agree very much with fructifying spec[imens] of the latter found by me—& I think I clearly observed the black male spots in yours—of which Hoffman speaks in his little pocket Flora of Germany [31], where is a handsome figure. I have had the good fortune this year to find *Sphaerocarpus terrestris* in the utmost perfection*—& a new *Targionia* which I have called *orbicularis* besides the *Targ. hypophylla*, which in my little work is not recognised—has since been met with by me. Of all these you shall receive spec[imens]. What I called *Thelotrema cinereum* may possibly be *Pyrenula enteroleuca* for I am not acquainted with that genus—& this Lichen was altogether new to me—but I think it looks much like a *Thelotrema*. As to *Evernia prunastri* being *Borrera furfuracea* you will convince yourself of Sprengel's mistake when you get my Lichen—Both these are so well known to me from their being extremely common in Germany —that I. am as certain of being in the right here, as concerning the next. *Cetraria lacunosa* aut nov—which has not the slightest resemblance with *Nephroma papyracea*—Sprengel's opinion concerning what I called *phyllophora* (*Cenomyce*) on the contrary I believe correct.

The passage of Sprengel's Letter to you, concerning the fungus I in a former letter to you had called *Isaria antheriformis*—on a slight examination, at first excited my mirth a good deal because I thought it altogether impossible that that could be an hepatic moss. After I had however at the suggestion of your letter submitted this *Isaria antheriformis* to a renewed examination by the compound Microscope—I have actually convinced myself that Sprengel must be in the right—altho' I cannot conceive how it happens that an Hepatic should be generated in damp paper. There is a complete Thallus or Frons of a texture entirely similar to that of *Sphaerocarpus* for instance [a rough sketch is inserted here] forming a kind of net work in longitud[inal] meshes—& the antheriform fructification—assuredly bears a strong affinity to the Horn of an *Anthoceros*—so that I was affected with something like

* When my little work was written I had not yet seen the ripe capsules, which I since found in plenty.

Sprengel's laetitia. I had not observed this texture before, & had indeed not conceived the frons to be an integral part of the specimen—I thought it was the substance on which the presumptive fungus grew. But I am convinced it really is the *Blandowia*. No fungus has any similar texture, & there can be no doubt of this frons belonging to the plant, because that texture is perceptible even in the lower part of the fructification.

I am very sorry you could not name all the Crypt. you have sent me—because your names would have undoubtedly been servicable. I must beg you to consider in my determinations of all but the Fungi (in which I pretend to some knowledge) that I cannot be any considerable authority except where I am borne out by my European specimens—as it is only of late that I have applied myself closely to the study. Don't suffer yourself however to be discouraged—exertion & communication will after a while enable us to be more confident than at present can be the case.

I beg you to excuse my scrawl & to let me hear from you again as soon as possible, especially concerning the Phaenog. plants I sent you and remain with high respect

Your most obdt Servt

LEWIS D V SCHWEINITZ

I should be extremely obliged to you for the whole title of the Species algarum—by Agardh [3]—together with a mention of the price of the work. If you have any means of procuring me a copy I would thank you—& with pleasure refund all expenses. I have this spring succeeded in determining about 40 kinds or spec. of fresh water algae all of whom except two or three are absolutely the same with the European Species.

TORREY TO SCHWEINITZ

NEW YORK Oct. 8th 1821.

Dear Sir

It is now near six months since I had the pleasure of receiving a letter from you, except I must consider as such the single line in the envelope of your Hepaticae. Indeed I can hardly blame you when there was so much apparent reason for thinking I had not used you well. You may depend I was exceedingly

mortified when on returning to town from the country I found the box which I had given to a person to put on board a Petersburg packet, still remaining in his hands. This was a month ago, & I hope, that as I then ordered it immediately to be sent, that you have received it safely long before this. I shall be very much dissapointed if it should be lost as there were in it many specimens of which I can not now obtain duplicates. How anxious I am to hear your opinion respecting these plants! Don't punish my neglect by delaying it long. There was a fine parcel of mosses from Massachusetts, some lichens, a few fungi & some algae.

For your present of a copy of your Hepaticae [74] I feel indebted to you as otherwise I should probably not have seen it until this time, the work not having yet been offered for sale here. I requested you to send me on a number of copies to dispose of on your account but they have never yet come to hand. When shall we have a continuation of this exceedingly desirable & valuable work. The *specimen* you have given the world will certainly have the effect of making all lovers of botany wish the complete work—Pray gratify them as soon as possible. You know I will be of all the assistance I can to you in furnishing specimens of such things as come in my way.

You will think me unreasonable to ask any thing more of you after such bountiful collections being sent to me, but really there are so many choice things described in your late work that I cannot refrain from adding a list of a few, any of which will be highly acceptable to me. This is at the end of the letter. How delighted should I be to see that *Andreaea* you mention in your letter. I did not suspect the genus was in this part of the world. Your monography of the genus *Viola* [68] I presume you have sent to the Philosophical Society as I have not heard of Silliman's receiving it.

Our *Gratiola neglecta* turns out to be nothing new after all, for in a letter I lately received from Sir J. E. Smith he remarks, "*Gratiola neglecta* is precisely the authentic *G. virginiana* from Kalm. The synonym of *Hort. Malabar.* belongs to a different plant, considered by Vahl as a variety of *G. trifida*, but I think it is still more unlike that species"—Now what is to become of *G. virginica* of Elliott? It is undoubtedly a different plant from

ours as the description in the "Sketch" [22] will show, Shall it be called *G. Elliottii?*

You ask how Sprengel could mistake what you have called a *Blasia pusilla*, for *Jungermannia pinguis*. Smith, in a work recently published by him (Correspondence of Linnaeus [81*]) has a note on Micheli's *Blasia*. He says "The accurate observations of Dr. Hooker have proved this plant to be a real *Jungermannia*, whose calyx & veil are imbedded in the leaf!" This is taken from the celebrated Monography of British Jungermanniae [33], a work which I have not yet seen, though I hope to do so soon, Mr. Le Conte having imported it from Europe. Now Sprengel being right respecting the *genus*, will not excuse his naming the species erroneously, *J. pinguis* & *B. pusilla* being little alike. I wish you could have had Hooker's Jungermanniae [33] in time for your Hepaticae [74]. It would have added much to its value to have the synonomy of this distinguished writer.

I am more and more puzzled respecting that little thing Sprengel calls *Blandowia* as it has so much the appearance of a fungus that I can hardly persuade myself it is not one. The place in which it was found, & its colour &c. all make me suspect it will yet be found an *Isaria* or somthing allied to it. Do you know where Willdenow found his plant? The work which Sprengel quotes is not to be found here— By the way have you determined that other curious little fungus found on moist paper in my herbarium & which you promised to subject to the microscope? I sent it to Smith, but he has left it unanswered. Do look at it again for it must be somthing curious, Linnaeus would probably call it a minute *Lycoperdon*.

I am happy it is now in my power to send you the 1st volume of Agardh's Species Algarum [3], which is all that is yet published— I also send you the Synopsis Alg. Scandinaviae [4] of the same author, & the 1st fasc. of his Icones Algarum [2]. These are duplicate copies which I lately received & beg you to accept. You need not think of any return for these, except you may have a couple of copies of your Hepaticae [74] to spare.

*[The copy of this work in the library of the New York Botanical Garden, formerly the property of Dr. David Hosack, has penciled against this footnote (2: 117), in Torrey's hand: " !(Inform Schweinitz of this)."]

Mr. Casström of Stockholm sent me the other day a new & very [. . . *] work by Fries of Lund.- *Systema mycologicum* [23] sistens Fungorum ordines, genera et species huc usque cognitas, quas ad normam methodi naturalis determinavit, disposuit atque descripsit E. F. 1821 &c.. The arrangement is totally new &, I think, much superior to Persoon's. The 1st volume (about half of the work) only is published & as it has just come to hand I have not had time to examine it much. Have you seen it? If you could be very certain of returning it in two months I would send it to you. It is probable, however, that I shall have another copy ere long, & if so, you shall have one of the two.

Next Saturday (when a packet sails for Petersburg) I shall send Agardh's books together with some plants which I hope you will be pleased with. My questions respecting the specimens will be put on the labels..

I am exceedingly anxious to procure specimens of American Algae—one set for myself and another for Agardh, with whom I have corresponded several years. Mr. Elliott sent me some lately, which I had not seen before. Have you any duplicates of those you have found near Salem? Can you spare some—

I want some Southern insects very much & will give in exchange for them European insects, or rare American plants & minerals—to any extent. Will you find a person to collect for me? I have only room to say I am sincerely yours

JOHN TORREY

P.S. The list of Hepaticae will be inclosed in another letter.

TORREY TO SCHWEINITZ

NEW YORK, Oct. 12th, 1821

Dear Sir

This day I shall put a collection of plants & books on board a Petersburgh packet which sails tomorrow. I hope they will reach you soon & that some of the things may prove acceptable. I wrote you a long letter a few days since in answer to your favour of April last which I had shamefully neglected.

On the next page is a catalogue of the contents of the package on which I have to make a few remarks—. I. The Cryptogamous

* [Page torn.]

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plants from the West Indies. These were collected twelve or fourteen years ago by a Frenchman by the name of Perrin. He brought his unnamed specimens to this city where he died. Dr. Hosack purchased the collection of his wife & after passing through various hands part of them have come to me. The rest I hope to get ere long. Duplicates of my specimens I sent to Sprengel which he determined and sent me a catalogue of. The names on the specimens I send you are such as he has given.

II. Plants collected by Nuttall on the Arkansas & Red Rivers in 1819 & 1820. I mentioned to you in a former letter of his being engaged in writing a Flora [54] of the Country he visited. It will soon be finished, & you will then find all the plants described which I send you. He had not given all of them names when he presented me with specimens. The *Marsilea*, *Pilularia* & *Cheilanthes* I hope will please you—

III. The North American Cryptogamia are only occasionally named, & I shall be exceedingly obliged to you for the names of all you are acquainted with or which you can determine without much trouble. Pray don't get out of patience with me for I am conscious I am unreasonable in asking so much. There is a fungus on the *Acer rubrum* of which I have put up a specimen, which I cannot determine. Do let [here are inserted the lists mentioned, 138 names] me know its name as soon as possible. The genus is certainly not in Persoon [59].

IV. The few Algae are duplicates from a collection sent me by Agardh & are named according to his works. *Gymnostomum Donianum* & *Orthotrichum Lyellii* are two rare Scotch mosses.— Have you *Tayloria splachnoides* of *Hook.* in *Brande's Journal* [62] [of Science and the Arts]. I can spare you a specimen. It is the *Hookeria splachnoides* of Schwägrichen.

V. The Phaenogamous plants are principally from the northern States, with the exception of a few collected by Prof. Douglass in the late expedition of Gov. Cass to the sources of the Mississippi. The whole collection was presented to me & a catalogue of it will appear in the next N[umber of Silliman's*] Journal [90].

VI. As you mentioned you wished to obtain Agardh's Species Algarum [3] I take the liberty of sending a copy. Perhaps you

* [Words supplied by the editors, the letter being torn.]

have his synopsis [4] & Icones [2]. In a little work I lately received from Germany (Jahrbücher der Gewächskunde [40]) is a short paper by Ehrenberg [21] on three new genera of Fungi, *Actinocladium*, *Campsotrichum* & *Enteridium*—Are you acquainted with them? Shall I send the book?

Please send your remarks on the plants of this package as soon as you have leisure to examine them. I can hardly ask anything of you until I send something more.

I was going to add some observations on your desiderata which you sent some time since but want of time & room prevent me—I also find I have lent Mr. Halsey your Hepaticae [74] & cannot get it in time to make out a list of the species which I want. Pray send me two copies by mail as soon as possible for which I will return money or other books. It is said to be for sale in the Philadelphia book stores but we cannot get anything readily from that city. Do you want Sprengel's Neue Entdeckungen [84] v. 1? I think there is a copy to be had here. It contains some valuable remarks on many new & rare plants, reviews of late works &c. Has Mr. Halsey sent anything to Mr. Van Vleck? Would it be worth while for me to correspond with him? I think you have put me under so many obligations to you that I shall have enough to do to prepare for you—.

With great respect I remain—Your grateful friend

JOHN TORREY.

REVD. L. D. SCHWEINITZ

SCHWEINITZ TO TORREY

SALEM Oct 29th 1821

DR JOHN TORREY New York

Dear Sir

It was indeed a pleasure, after rather a long time of anxious expectation to receive your kind letters of the 8th & 13th of this month at once. They afforded me a scientific feast besides the grateful feelings for what you have so kindly sent me.

I do not entirely however understand, whether the box you put on a Petersburg packet on the 13th containing such a variety of invaluable plants, that I can scarcely wait patiently until I see them, is the same with the one you mention as neglected to be sent

by the persón you gave it to containing among the rest about 200 crypt—(Mosses from Massachusetts &c.). If it is not, I am very sorry to say I have never received that, & must fear its being lost. I hope you have addressed either if two to Mess. Caldwell & Orr, Petersburg—

Before I enter upon the rest of the Contents of your highly interesting letters, I must inform you, of a very important change just about taking place in my situation, which tho' it will on the one hand probably render me less useful to you, will on the other enable me to indulge a hope of soon seeing you personally, & of in future enjoying an easier & shorter communication with you. I have accepted an appointment at Bethlehem, Northampton County, Pennsylvania & shall reside there in future, & expect to leave Salem about the 20th of November.

In consequence I have sent directions to Petersburg to turn back your package on the way hither, that I may meet it at my future home. It is probable that for some time after my arrival there my avocations of duty will be such as to prevent me from indulging much in my favorite study; but when I shall be enabled to resume it—I shall evidently enjoy considerable advantages from being so near New York & Philadelphia, more especially in respect of my intended publication. I may flatter myself now likewise with a visit from you to look over my collections (which God speed safely by sea & land! for I should be in despair if they were lost or injured—they are under way now!) & will be sure to find out an opportunity of calling upon you as soon as possible. In the mean time I beg to request you to forward anything you kindly communicate to me, from & after the receipt of these presents to Rev. L. D. v.S. Bethlehem, Northampton County, Pennsylvania—I scarcely know how sufficiently to express to you my thanks concerning the books you are sending & beg you by all means to send the Systema mycolog. of Fries [23] you mention as soon as you have a duplicate copy—& likewise Ehrenberg's [paper in the] Jahrbücher [21] & Sprengel's Neue Entdeckungen [84]. You are welcome to Specimens of all my hepatics as soon as I shall have time after my arrival. By next mail I shall direct Mr. Gales to send you 2 Copies of my pamphlet [74]. He has informed me that he has forwarded a parcel to New York for sale. I wonder they had not arrived.

Altho' I shall probably be situated in a less fertile part of the U. S. in Bethl. as to Phaenogamy [see 70]—I think there is good prospect for Cryptog. there; & it will be easier to communicate with Mr. Elliott from thence than from here. Besides my friends here lovers of Botany will not fail to furnish me with any thing they can get, in order to supply your wants.

I hope to be able to give you almost a complete set of our Algae aquat[icae] aq[ae] dulcis.—They are however absolutely identical with the European ones. I have pretty diligently & accurately determined about 55 species—all of them however from the spring of the year, as it is much too dangerous in the fall & hot summer to be stirring up the mud of swamps & ponds. I however suspect that a good number may still be discovered later in the season.

Accept my dear Sir the renewed assurance of my grateful respect & do not scruple I beg of you, to call upon me for anything you wish & depend upon it, that if it is in my power I shall do my best to oblige you.

My Monography of the Violas [68] is sent to Silliman, who has promised to insert it in the Number of the Journal [6] after the next.

I remain with high respect
Your sincere friend
L D v SCHWEINITZ

Of the *Andreaea* I have a very great quantity.

By all means preserve for me the Specimen of *Hookeria splachnoides* you mention. I have been anxious to get it.

[SCHWEINITZ'S letter of December 28, 1821, is missing.]

TORREY TO SCHWEINITZ

NEW YORK Jany. 31 st, 1822

Dear Sir

Your letter of the 28th of last month, I received about a fortnight since. I am much pleased to hear that you safely arrived at your new place of residence where I wish you much happiness. Being now so much nearer together we can communicate specimens & letters much more speedily & safely than we could before & flatters me with the hope that before many months we may see each other face to face. I am very glad that those packages,

about which I was so concerned have been safely received at last. The part of the package Marked No 5 & consisting of Phaenogamous plants of the Northern States I have ascertained was by inadvertence left behind. It is safe, however, & shall be forwarded by the Easton Stage in a very few days. I shall add to it a small parcel from Mr. Halsey which has been lying in my office several months—also Sprengel's Neue Entdeck. [84] & [the] Jahrbücher der Gewächskunde [40]. If Mr. Halsey has finished using Fries' Syst. mycologicum [23] I [shall] put it in the package for you, hoping it will be returned in about two months. Of Sprengel's book I have another copy, & beg you will keep the one I send you. I enclose in this letter a specimen of the *Tayloria splachnoides* of Hooker, which I received from Sprengel. It is a very singular moss, & an excellent description is given of it in Brande's Journal of the Royal Institution [62], with a much better figure than either Schwägrichen's [66], or that in Bridel's Supplement [12]. It appears to me also that there is very good reason for changing Schleicher's name, as Smith had previously applied the name of *Hookeria* to the *Hypnum lucens*. (*Pterigophyllum* of Bridel). It is surprizing that I should have committed such a mistake respecting the *Xyloma acerinum*. I was prepossessed with the idea of its being something uncommon, & was determined to make it so.

With what impatience do I wait to hear from the last package of Cryptogamia I sent you! How long will it be before you will have leisure to examine them? You must not get out of patience with me for giving you so much trouble, & all I hope is, that some of the specimens may supply desiderata in your collection. The two copies of your Hepaticae [74] I received safely, in good time. Shall I beg the favour of two more if you have them to spare, & let me know the price of them that I may remit the money. I want them for my correspondents in Europe. The *Cheilanthes* collected by Nuttall must be *C. vestita*. I had never seen any species of the genus before this.

On looking over my file of letters, I observe your favour of the 29th of October last has never been answered. I must beg pardon for this carelessness & say in palliation, that I delayed writing to you until I should hear that you had arrived at Beth-

lehem, which will excuse me for two months. Does your Monography of the genus Viola [68] embrace all the species of the Northern States, or only those of North Carolina? I wish you would write to Silliman to let me correct the proofsheets, or else attend to it yourself, for he is totally ignorant of Botany & will make a thousand blunders. That little paper [90] I published in his last No. is full of typographical mistakes & makes me blush whenever I look at it Dr. Ives promised to overlook the printing, but his practise is so extensive that he has no time to attend to anything but his profession—There is no other botanist of consequence in New Haven—Will you have any plates? Did you know that Le Conte has long been engaged in writing a Monography of the Violas? He has about 30 species drawn, many of which I think are only varieties. *He will never publish anything.* You have probably seen him on his way South—if not he will call on you when he returns in April. He will not stay away so long as he used to do, now he is married—His father died the other day, at Newark—

Do not fail, my Dear Sir, to send me those fresh water Algae as soon as you find it convenient, & also your new *Andreaea*, which I am very anxious to see.

Since I wrote you last I have received a letter from Bridel in which there is a catalogue of some mosses I sent him. Of 93 specimens, he considers 33 new species! And in many of his determinations he differs both from yourself & from Sprengel—The following are some of your differences

Bridel	*Schweinitz*
No 4 Schistidium subsecundum sp. nov..	Anoectangium filiforme
No 58 *Cool*[*ey*] Grimmia atrovirens " " .	Orthotrichum pumilum
Hyp. a Leskea turioniformis " " .	Hypnum hians
50 *Cooley* & 5 *Dewey*. H. curvirostrum sp. nov.....	—— piliferum
No 8. Dewey. H. serratipilum sp. nov. . .	—— confertum
No. 70- ead.....	—— recurvans
—— 83 H. curvifolium v. minus	—— cupressiforme
—— 53 Cool[ey]—cupressiforme v. tenuis.	—— micans? Muhl.
—— 78 —falciforme sp. nov.	Leskea varia
—— 68 —patentissimum sp. nov. . .	Hypnum radicale

May I not repeat a question I once asked you—What certainty is there [in the] nomenclature of the lower orders of the Cryptogamia? In the genus *Hypnum* particularly, I scarcely find two botanists who agree about the name of any of the species. Some months since I sent a large box of mosses to Prof. Hooker the British Muscologist & when he returns a catalogue of them I shall no doubt find him at variance with most other botanists who have determined them before.

I am now engaged in writing my Flora of the Northern States [89], the first number of which I am preparing for the press. I hope you will assist me to the plants growing in your vicinity. There are many species enumerated in Muhlenberg's Catalogue [52] & said to be natives of Pennsylvania, which I do not know under his names. I shall send you a list of them soon—

I have only room to express to you the high respect,
with which I remain— Dear Sir—Your obliged friend

JOHN TORREY

[SCHWEINITZ's letter of February 25, 1822, is missing.]

TORREY TO SCHWEINITZ

NEW YORK. March 18th 1822

Dear Sir

Two or three days ago I received at my father's house at Greenwich (where I had retired a fortnight for the purpose of arranging my herbarium) a note from an unknown person informing me that he had called repeatedly at my office with a package from you & had not found me at home. I desired my brother to call for it, but the gentleman was absent. On Saturday night (the day before yesterday) I received another note from the same person, informing me that he would leave town to day for Bethlehem. Yesterday being Sunday I could not prepare any thing for you, but this morning I have put up 35 species of Cryptogamia, & Sprengel's Neue Entd. [84] with Treviranus &c. These are added to the Phaenogamous plants which were left out of the last package by mistake. Mr Halsey's little package is also inclosed. I know not whether I shall secure this opportunity or not, but I shall carry the package to town immediately at a venture. I am also as

yet, ignorant what your package for me contains, though it will doubtless be very interesting I thank you *in advance.*

I shall write you at greater length by the post, as I must here close for want of time

I remain Dear Sir Your much obliged, & very humble servt

REV. MR SCHWEINITZ JOHN TORREY

If I have time this morning when I get to town I will put up for you the work of Fries on Fungi [23] which I beg you to return in a month.

TORREY TO SCHWEINITZ

NEW YORK, May 3rd, 1822

Dear Sir

The last letter which I have received from you is dated Feby. 25. It unaccountably was more than a month in reaching me. I should have answered it before had I not had some hopes of hearing from you on the subject of a package of plants sent you by the hands of a Swedish gentleman a few weeks since. But it [is] now quite time I acknowledged the great obligation I am under to you for the catalogue containing the results of your examination of my specimens. You must not get out of patience if I should trouble you three or four times yet this season. There is no person in this country but yourself with whom I can correspond on the subject of Cryptogamia & as you have devoted yourself more exclusively to the Fungi, I shall pay the greatest share of my attention to some other branch—probably the *mosses.* So that my opinion may one of these days have some little weight. You must therefore bear with me, in the hope of my being at some future time of some use in the way of consultation. I need much assistance from such a veteran in science as yourself, for when I work too long alone I begin to get discouraged. I hope the package I sent by the Swedish gentleman (I forget his name Lil—— something [Lilienkron]) reached you safely & that you will soon have time to examine its contents. I have now some more specimens ready, a few of which are very rare to me. They shall be sent by the first opportunity. I would rather not send by the stage as the men connected with it seem to me very disobliging.

You kindly offer to send me a list of the Cryptogamia of

your collection but I fear I cannot repay you for the great labour it will cost you. Prof. Silliman has not yet sent me the proof-sheets of your monography [68] to correct. You must insist on this being done (if you do it not yourself); for if the press is corrected in New Haven, the paper will be full of errors. Will you please request him to print a few extra copies of it.

Mr. Le Conte arrived here from the South a day or two ago. I informed him of your intention of writing on the Violets, at which he appeared a little disappointed! He will never publish anything in my opinion, as I think I know him well. You have probably seen his beautiful Drawings—but has he not made *too many species?* With the Southern *Violae* I am not much acquainted, but there is not one yet found in the Northern States unknown to me & there are not more than 7 or 8 species. Le Conte makes a great many species of two or three variable kinds growing here.

I am of your opinion respecting Sprengel. He appears to examine specimens much too slightly. He has given the same thing sometimes three different names! Bridel, on the other hand, appears to be too accurate if I may use the expression, for he makes too nice distinctions. No doubt many American species have been confounded with European ones which they much resemble, such as the *Climacium americanum* &c., but Bridel has hardly confirmed any of our determinations except when species peculiar to this country were named.

I shall inclose you some remarks on your last return-list if I have time. You will allow me to be candid & state my objections when we differ in opinion. This is the only way to get at the truth.

A few days ago a friend of mine (the Rev. Ed. Hitchcock of Conway, Mass.) sent me for examination a book of drawings of Fungi 120 in number, done by his wife. I should be very glad to have you look over them, but he wishes the book to be returned by June 4th next, as that will probably be the only opportunity of sending to him for some months to come. Now if you know of any means of returning them to me by that time if I should send them, please to inform me as soon as possible. I shall send you dried specimens of many of the plants figured.

I am now driving at my Botany of the Northern States [89]. I

shall certainly avail myself of your kind offer of assistance—In the cryptogamia I shall trouble you much. I am very fortunate in having Mr. Nuttall to stay with me, probably for two months. He is to give a course of lectures here on Botany. We are both bachelors & he is to stay altogether at my office, so that I promise myself a great treat from the company of this celebrated naturalist. He is much devoted to mineralogy which is a favorite pursuit of mine also. So that we shall have our hands full while he remains.

As you are now settled not a great distance from the place where Muhlenberg resided, you will probably find some of the plants enumerated in his Catalogue [52], which are not to be found here. There are many of his species which are not described under his names in any work that I have seen. Probably some of these are new, but the greater part must now be anticipated by Pursh, Nuttall, &c., but it would be desirable to know all his species with certainty. Have you any specimens from him? Is there any probability that the long-promised *Flora Lancastrensis* will ever be published?

May 4th— I perceive, that owing to my Herbarium being in considerable confusion from removing, & the variety of business I have on hand, that it will be out of my power for a week or two to compare your last list with the specimens to which it refers. This however shall be done as soon as possible.

If I do not hear from you in the course of a week I shall endeavour to have your package forwarded by the stage as you once directed. There will be about 100 more species of cryptogamia. Do let me hear from you as often as possible.

On looking over the collection of Musci you sent me some time since, I perceive that the moss you named *Leucodon sciuroides* is altogether different from my European specimens as well as from the species you once named as *sciuroides* for me! It is probably a *Leucodon* for the teeth, if I am not much mistaken are cleft as in *Dicranum*, but it is nevertheless what I long ago determined to be *Pterogonium intricatum*, & has been so named by Sprengel. Will you look at this again—

With respect,
I remain
Dear Sir Yours &c
JOHN TORREY

THE REVD. L. D. SCHWEINITZ

SCHWEINITZ TO TORREY

BETHLEHEM May 15th 1822

Dear Sir

By last mail (unaccountably late) I had the pleasure of receiving your favor of the 3d instant—by which I was among the rest apprised that the short letter which I wrote you immediately after the extremely acceptable receipt of the package brought me by Mr. Lilienkron had not arrived. What can be the reason of so frequent a failure of letters between us, or at least of their delay, while nothing can be more expeditious & punctual than the arrival at & from New York of all my business letters? Perhaps I do not sufficiently express your address. In that case—I earnestly beg you to furnish me with a correct one.

The above package, together with the books was, I must therefore repeat, most safely delivered to me by my Swedish friend. You cannot imagine how much I am delighted with Fries [23]—I know I ought to have returned it before this—but unhappily I have been so much occupied with official duties that I have not yet got thro'—but the next opportunity that offers—you may depend on receiving it back—as I hope to compleat my extract in a few days. I most earnestly beseech you to procure the book & its continuation for me at any price. The system I think very conformable to my own observations.

I hope you are not in earnest when you excuse yourself for troubling me so often—no greater pleasure can I receive. I am delighted with the Idea of your devoting yourself to the Musci—& hope that we jointly shall one day be able to make out something like an Am. Cryptog. The last mosses you sent I have not yet had time to examine with anything like accuracy—but will do so, as soon as possible.

In case you send me anything by the Stage—please to address it to the Care of Mr. Philip Mixsell, Easton—Depend on it I shall send you a list of my Cryptog. collection (designating my authorities) in as short a time as I can.

Prof. Silliman promised to send the Proof sheets to you of my little dissertation on the *Violae* [68]—& I am in despair to hear he has not—for in that case, to judge by the Litchfield Catalog [Brace, 11] in the last numbers—there is not the slightest hope

of it being intelligible. I had mentioned a request to him to have a few extra copies printed—but as his answer did not notice this request I am afraid it may have been neglected. I have only seen a few of Mr. Leconte's drawings of the *Violae*—I cannot judge therefore of his species—but I am not so little inclined to admit new species as you seem.—A long continued study has perfectly convinced me, that some which you probably only look upon as varieties are really specifically distinct. At this moment they are in full bloom—but to be sure I find none here, about Bethl. but such as are well known—altho' most of the common species here, are entirely different from those in N. Carolina.

By all means I pray you be very strict in your strictures on my nominations—I can hope to arrive at truth only by such. The delay of your last—I am very sorry to say will necessarily deprive me of the enjoyment of the 120 Fungi—because it must be impossible to return them to you by 4th June—send me dried specimens however.

The enjoyment you are going to have in living together this summer with Mr. Nuttall I can appreciate, since I had the exquisite pleasure of becoming acquainted with that excellent man at Philadelphia. Be so kind as to present my compliments to him & to request him to mention once more all the specimens we spoke of, which he would be glad to get from me. I will send them on to you—All my exertions which you may command especially in Crypt. are at your service in the publishing of the No. Am. Bot. [89]—perhaps you would take the trouble to particularize those plants of Muhl. concerning which you want information. I had a great many from him. The Flora Lancastr. I fear will never see the light—nor indeed do I think it would be very valuable—as Mr. Conrad tells me he can in many instances not read the text (altogether credible to those who saw Muhl[en]b[er]g's hand).

I believe you are altogether right as to my mistake concerning *Leucod[on] sciuroid[es]*—sent you by me—I find that by some negligence mixed specim. of *Leu. sciur.* & *Pterig[onium] intricat[um]* are put up in one paper by me in my collection for communication.

In warm hopes of soon hearing from you again & receiving the

100 Cryp. you announce, & with a request that you will be so good as to think of the Phaenog. plants I still am in want of I remain

Yours most affectionately

LEWIS D v SCHWEINITZ

[TORREY's letter of July 16, 1822, is missing.]

SCHWEINITZ TO TORREY

BETHLEHEM July 21st 1822

My dear Sir

Exquisite would have been the pleasure your kind favor of the 16th instant would have given me, had it not been for the circumstance that you appear not to have received my last letter together with the Volume of Fries [23] which I sent you, the receipt of which is likewise not mentioned. It to be sure contained nothing of any moment, but I should be extremely sorry to hear that so valuable a book had been lost—I entreated you to procure me a copy of it at any price.

I believe it is a good plan to leave a package for me at my friend Mr. Mortimer's—but I am sorry to say I have not yet received that, which you kindly mention. Prof. Dewey at Williams College writes to me, that he has sent a package for me to your care—which please deliver over to Mr. Mortimer likewise when it arrives. I shall write to him on that account. But I must claim your indulgence till winter comes on for a scrutiny of Cryptogamous plants sent me. Then I hope to be disembarrased of the Boarding School superintendence. At present I have hardly leisure to look over Phaenogamous plants—Perhaps you will be able to send me some of those New Yorkers on my list, which you have not yet communicated—& I should likewise be extremely glad to get a number of those in Prince's garden which are still wanting to me. The moment I have time I will make out a list of my American deficiencies for you.

I deplore most sincerely that you had not time to subjoin your remarks on my *Violae*—by all means let me have them as soon as you can. Possibly Mr. Leconte's observation concerning my having made too great a number of species, may be considered just by many—I was guided however by the study of the greater part in nature & in successive years—& find, as far as my time

allowed me, my observations here in Pennsylvania generally to confirm my opinions. The only species which I think admit of further doubts are—whether *V. cucullata* & *obliqua* ought not to be united after all; whether *cordifolia* be not too near *villosa* Ell. & whether *repens* should be separated from *ochroleuca*—

Of the rest I am pretty certain. *V. pubescens* common here & never found in N. C. is extremely different from *eriocarpa*. Is not the *V. Selkirkii* you mention perhaps related to my *punctata* from Labrador? The specific difference of *V. palmata* & *asarifolia* (the latter never occurs here but is common at Salem) is beyond doubt.

Accept of my best thanks for the curious little moss from Florid[a] & the highly interesting *Roccella* from Thule. I conceive however that the Captains who assert this to be the only vegetable there, do not regard crustaceous Lichens as such—for I cannot believe that any rock is utterly devoid of such.

I shall be much obliged to you for the subterraneous fungi from the Coppermine.

Tho' I am almost perfectly ignorant of mineralogy—I read what you communicate on that subject with great interest, as everything concerning natural history is valuable to me. But still I must confess to you, that I am too much of a devoted Botanist, not to feel a little jealous, that the sister science appears to injure Botany by thus withdrawing from it, its most able & active cultivators like yourself and Mr. Nuttall. I hope however you will no more desert the service of Flora than he for that of Plutus or at least some of his cousins.

The *Roccella* you so kindly sent me puts me in mind to request you if possible to procure me a specimen of the common *Roccella* (which I believe may be had in shops—as it is a dyeing article). I have lost the imperfect one I had & your gift has reinstated the Genus.

Any tropical specimens of whatever kind would likewise be acceptable to me—& very much so—plants from the South of Europe in which I am very deficient.

With sincere respect & esteem I remain
Your obdt Servt
LEWIS D v SCHWEINITZ

Mr. Elliott has sent me his 7 number [22] & promises to send on No. 8 shortly.

I will just add, secund L D v S, the names of the *Violae* which I have observed this spring in & abt Bethlehem.

[Lists 28.]

SCHWEINITZ TO TORREY

BETHLEHEM Nov 24th 1822

DR. JOHN TORREY New York

Dear Sir

The uncertainty whether the distressing calamity with which New York was visited, might not prevent a letter from reaching you, hindered me from writing to you sooner; I am now however occupied with examining your last kind packages of Cryptog. & should on that account have deferred writing still longer in order to give you my determinations, had not the present good opportunity offered for transmitting to you a copy of a small work bearing my name on its title which was sent to me from Germany[75]—to my no small surprize, as I was utterly unaware that it would be published—altho' I must confess myself the author. I left it with a friend some years ago, without any such Idea—but have no objection that he disposed of it in that way. Possibly it will be not uninteresting to you—as it contains a list of all the Fungi I had observed in N. C. previous to 1817—with descriptions of the new ones & I beg therefore of you to accept it as a token of friendship.

If you could again favor me with some of the New York—or other American plants still wanting in my collection I should be very much obliged to you.

Do you think there would be any hope of procuring for money or other consideration such plants from Mr. Prince as his garden affords—in dry specimens? I am told he cultivates most of Mr. Nuttall's & other Missouri plants. If you think it possible I would thank you to point out to me the necessary measures. Prof. Dewey wrote to me some time ago that he was going to send some plants to you for me. If he has, the gentleman who brings this, will be kind enough to take them in return.

In a short time I hope to send you a list of my determinations of your last packages.

Excuse the great hurry with which I write not having a moment to lose, if I wish to make use of the present opportunity.

Don't forsake Flora altogether for Mineralogy & Geology, & believe me with sincere affection

Your most obdt Serv
L D v SCHWEINITZ

[A Torrey letter seems missing here.]

SCHWEINITZ TO TORREY

BETHLEHEM December 18th 1822

My dear Sir

On the two first pages I have given you a list of my determinations of the different numbers of your Cryptogamic plants. Those underlined were new to me, at least in America—those doubly underlined have been named by me. It will scarcely be necessary to remark that it is exclusively the Fungi & Lichens upon which I conceive you may place dependence as correctly determined. Hepatic mosses but a few only occurred—& as for the Musci—more especially the *Hypna* I confess I despair of doing anything satisfactory—without observing them in nature. Some 20 or thirty species of *Hypnum* may be easily distinguished; the rest I conceive almost mere matters of faith. How it happens that so great a number of the series appear blank I know not—probably you sent me specimens of those numbers—For a dozen or two blanks to be sure, I fear I can account (those however were altogether of little moment) the Papers videlicet perished by one of those sad accidents which married botanists are subject to—under the careful hands of the ladies, who are, you know bitter enemies of all & everything that can by possibility be attacked with a broom. I most heartily wish that you may derive half as much satisfaction from my determinations as the kind communication of the specimens gave me. You will see what a considerable number form valuable additions to my collection. The whole number of Fungi—seen by me in Am. including those you sent now amount to about 1660 species of which I preserve nearly 1300. Let me request you kindly to continue your communications & to command anything in my power. I was delighted with the assurance your last agreeable letter contained, that you

have again taken Botany in hand. I was almost tempted to publish a counterpart of the Poetical Geology in Silliman—to be entitled the Tears of Flora! describing her despair at the desertion of her votaries but am glad indeed that her own charms have brought yourself & others back to her shrine. The small packet you lately sent me was peculiarly acceptable as it contained some very interesting new species. I have entered them in the General List, but beg to add a few particular observations.

Botrychium simplex. I hailed with particular joy. Two or three specimens perfectly agreeing with yours had been obtained by me from Canada & been called by me *B. pusillum.* Your name is better & has been adopted.

367 [*Rhizomorpha abietina**] is most undoubtedly *Rhizomorpha*—but a new & distinct species—I should be greatly obliged to you, if you allow me to keep it, as it is in a most interesting state for observing what is considered the Fructification of this Lichen (accord[ing] to Acharius) & justly I think.

365 [*Rhizomorpha crocea*]—my *Rhiz. crocea* in a no less interesting state.

370 [*Craterium floriforme*] is a most desirable new species of the Genus *Craterium* of Nees, hitherto containing a solitary species. This new species forms a remarkable link in the series—which was wanting.

372 [*Bartramia an nova*] male flowers of a *Bartramia* or *Mnium*—is this perhaps the true *B. grandiflora*?

374 [*Sclerotium radiciforme*] comes on a wish!—the third species of a remarkable subdivision of *Sclerotium* called by Nees *Thanatophytum* from the destructive effect of the only European Species on the Bulbs of *Crocus* in France.

366 [*Targionia hypophylla?*] Without fructificat[ion] I take it for the frons of *Targionia hypophylla.* What is however the other moss among it with . . . ? [a few words torn out].

I was not a little distressed to hear of the probable loss of the plants sent me by Profes. Dewey. I should greatly deplore that loss—if I did not entertain a hope that they may still be recovered. The package you left at Mr. Mortimer's was received tho' after a very long time—I beg pardon for not acknowledging it in my last.

* [Portions in brackets inserted from the list accompanying this letter.]

As you so kindly permit me to trouble you with further requests I shall take the liberty of stating to you, what I most eagerly desire to acquire. Any *cryptogamous plant determined*—& all undetermined American Cryptog. plants are highly acceptable but equally so all Phaenogamic American plants—not yet in my collection. You will greatly favor me by trying to procure from Mr. Prince, Missouri, Louisiana, or western specimens & I inclose you a list from Nuttall of the Missouri &c. which I have not. Next in order come determined European Phaenogamic plants especially from Spain, Italy, France or Greece—& Graminaceous ones from any part of the world. Lastly exotic plants from tropical countries are highly acceptable, the Filices in equal degree with any others. Having the agreeable prospect before me of enjoying a little more leisure the ensuing year—I shall exert myself to lay in a stock of everything I meet with in order to supply you & your friends. I can expect to be of service to you only as regards Cryptogamia.

Let me call your attention for a moment to one of the next numbers of the Journal of the Phil. Academy of Nat. Sciences in which you will find a dissertation of mine on two interesting hepatics [72]—of which I can send you specimens. I earnestly beg you may not scruple to demand anything in my power. In the course of next year I hope to have the pleasure of seeing you at New York. I mention to you that in the first weeks of January I shall probably be absent from home; but do not suffer this to induce you to retard sending on anything you may favor me with, as no greater pleasure could be enjoyed by me than to find large packages waiting for me. If you should happen to see Mr. Leconte please to tell him that I sent a copy of my Carol. Fungi [75] to him by the same opportunity with yours—the receipt of which I am ignorant of.

With sincere esteem

Your Most obdt Friend & Svt.

L. D v SCHWEINITZ

TORREY TO SCHWEINITZ

NEW YORK March 17th 1823.

My Dear Sir

I am ashamed to acknowledge your esteemed favour of December last at this late day. The principal reason why I have delayed writing is that I expected to accompany an expedition which was to have set out this spring for the Rocky Mountains. All my time was employed in making preparations, such as packing my plants, arranging papers &c.—But after all, the Secy. of War has concluded not to send the expedition. Before writing about my own business, however, I will answer your letter. The determinations of my cryptogamic specimens delighted me much, as I was exceedingly anxious to receive them. I regret however to find so many blanks in the list. For those between Nos. 374 & 447 I can account as I passed over a whole hundred in numbering, & afterwards commenced filling up the chasm—I shall continue filling this up till I get to 447, & then proceed regularly from 504 where I left off. But before the No. 374 there are 52 scattered blanks, & these too, respecting specimens I was very anxious to hear about—Many of the blanks I believe are *Jungermanniae.* You mention some of the specimens having been destroyed by a broom—but that was probably not the cause of the whole loss. But it is useless to regret. I believe I can supply most of the deficiencies from my retained specimens—Indeed, I am confident that I can send you duplicates of many of them.

I am pleased that you agree with me respecting that new little *Botrychium.* You have before this time, doubtless, seen Mr. Hitchcock's description of the plant in the last No. of Silliman's Journal [30].

No. 374 you observe is a new species of *Sclerotium*—I am much pleased with this information. as I had determined the fungus to be a *Sclerotium* & could not find a description of the species, though I hardly dared to call it new.

No. 366 you suspect to be the *Targionia hypophylla*—Is it not a *Jungermannia?* The plants from Prof. Dewey are certainly lost. The loss is as great to me as to you, as there were in the box a great many good things which our friend kindly intended for me.

In a very few days I shall look over my duplicate West Indian plants, & select for you such specimens as I have. There may be about a hundred, all of them determined by Sprengel. Of European plants I might possibly send you a few not in your Herb. Can you send your desiderata? Perhaps I have a few from France. There is a man in Philadelphia who has a large collection of W. Indian plants I am told. You may hear of him from Le Sueur. The paper you published in the Journal of [the] Acad[emy of] Scien[ces of] Philad[elphia] [72] is very interesting & does you much credit—& would indeed honor a Hooker. Can you furnish me with specimens of those two rare plants?

As I informed you, I have been much employed this winter in preparing for the intended exped[itio]n you will not expect me to give a very long account of my labours in Botany—I have looked at some things however. The genus *Jungermannia* has engaged much of my attention. I am gradually describing all the N. American species that come to hand & making drawings of the new or exclusively indigenous species. Your little book [74] is of great assistance to me but I occasionally differ from you in opinion which I know you have too much frankness to be offended with. I have been studying the splendid work of Hooker on the British *Jungermanniae* [33]. It is a delightful performance & I believe very accurate. You did me the favour some time since to send me some specimens of N. American *Jungermanniae* determined according to your book. There are yet a number of species I have not in my Herbarium. I should be greatly obliged to you if you would spare me specimens of them. They are as follows

Jung. pallescens	*J. pauciflora*	*J. resupinata*
— *trilobata*	— *connivens*	— *umbrosa*
— *reptans*	— *Ehrhartiana*	— *quinquedentata*
	J. exsecta	
	— *bipinnata*	
	— *pubescens & oblonga*	

Several of the above I may have, but they are of my own determination & I should wish to compare them with those thus named by you. I will add two or three other Hepatics in your book, specimens of which are desired by me, viz., *Targionia orbicularis*, *Anthoceros carolinianus* & *jungermannoides*. My

collection of foreign *Jungermanniae* embraces the following species [lists 49].

I know not how I can get along without Weber's work [93]. What is the price of it.—Are there plates? I sent for a copy many months ago, but it has not yet come. Concerning several of your determinations of my Jungermans. I would make a remark or two—No. 321 you have named *J. tridenticulata*. Will you have the goodness to look at the specimen again. Perhaps I put up by mistake a spm. of *J. trilobata*. My specimens agree with Hooker's plate very well, except the loculi are more numerous in the former. No. 366 "*Targionia hypophylla*." In the paper from which I took your specm. there appear to be two species. One of them (large & green) seems to be the *Jung. epiphylla*, the other (small & red) is very near *J. sinuata* but still not exactly that. I could not find on it anything like fructification.

No. 325. "*J. curvifolia*." This seems to be Hooker's plant, & agrees very well with my European specimens, but I think it different from one that you sent me as *J. curvifolia*.

No. 322. "*J. capillaris*." Is this the *J. trichophylla* of Hooker & others? It looks much like Hooker's pl. 7.

No. 281. "*J. nova*." This I have described as a new species, but I have some suspicion that Hooker has it.

No 269. "*J. viticulosa*," not so according to Hooker, as there are stipules in that plant, while they are absolutely wanting in mine. I have a little suspicion that it is *J. asplenioides* notwithstanding the leaves are entire. Hooker says the leaves are occasionally entire. I know my specimens are much smaller than the European *J. asplenioides*.

"*J. sertularoides*." The Linnaean plant is probably *J. trichophylla* & *J. sertularoides* is put as a synonym of that species by Hooker but the American plant is totally distinct. Do you believe the *J. laciniosa* is very distinct from *J. sertularoides?*

I must here close for want of room. Do let me hear from you soon. I had a glimpse of Mr. Halsey a day or two ago when I was much engaged. He had something to communicate from you which I shall go & hear tomorrow. I returned the other day from Philadelphia, where I spent a fortnight very agreeably with the de-

lightful scientific society there. I saw Muhlenberg's Her[bariu]m but did not examine the whole of it.

I remain Dear Sir,—your faith & humb servt.

REV. L. D. SCHWEINITZ JOHN TORREY

SCHWEINITZ TO TORREY

BETHLEHEM April 2d 1823

My dear Sir

Your favor, postmarked the 28th ult., arrived yesterday & did not fail to give me the most sincere delight, for I had been anxiously expecting to hear from you, & had begun a letter which I now lay aside in order to answer yours. Greatly as I deplore that you have been disappointed in the Expedition to the Rocky mountains which must have produced to Science, yourself, & I flatter myself to me, such a harvest, I am still glad to know you are in our vicinity & that I shall have a chance of seeing you, in case I succeed in my design of coming to New York on a visit. But I most sincerely wish you could make it possible to come hither & spend some weeks with us—in which case my collections would ensure to you at least some entertainment. I am very glad to hear that my attempts to determine your kind communications were agreeable—but greatly regret that, excepting Fungi, in which family I can assume a little authority, they are so little to be depended upon. I think you misunderstood a part of my letter—I do not believe that either broom or other enemy of Science actually deprived me of anything I received from you. It was only the labels or papers whereon I had marked your numbers & my determinations, which were partly swept away & I had neglected to mark your numbers in my Herbarium, whither I had before the Catastrophe arranged your presents. After all I was not aware of the nature of your numbers & imagined they had no relation to what you sent me, but refered to your own collection. I shall take care in future to be extremely particular in noting down whatever you mark on the papers & labels immediately. Mr. Nuttall promises to send me shortly all his Cryptog. for examination—which I hope he may do.—I am greatly grieved at the loss of Prof. Dewey's plants—but intend to write to him for a renewal if possible. You will most signally oblige me by sending West Indian or indeed

any plants you can spare or procure—& as a method of enabling you in some measure to judge what would be particularly acceptable of European plants I shall take the liberty to pack up with those you have desired in your letter (mentioned below) my Catalogue of Herbar[ium] & those wanting, having just made a new copy —tho' I fear you will not be able to read my Scrawl. Perhaps it may afford you an opportunity to send for this & that you might wish to have—I promise to keep back nothing of which I have duplicates. Mr. Nuttall gave me information concerning the Collection of Cuba plants you allude to—but 12$ per hundred those extremely badly preserved—exceeds my finances. I enclose to you this time a general list of my *desiderata* in Am. Phaenogamy with a particular request to procure as many of them as possible either from collections, or from Prince's Garden. I would go to some expence to get them. Is there no possibility of procuring any of the plants that Dr. James brought in the last expedition? American plants I value at least treble others—because my collection is already so considerable. You are a happy man in having succeeded to get at least a glimpse of Muhlenberg's Herbar.—which I have several times vainly tried to get at. Is the Cryptog. part so arranged as to afford an opportunity of looking it over? It will be absolutely necessary to do so as to the Lichens, because Muhl. Cat. [52] contains a number of names nowhere else occurring.

I was very much delighted with your zealous labor on the Hepatics & will with pleasure afford you all the aid in my power—According to the French adage—highly respected by me, & which ought to be the motto of all naturalists "qu'une erreur découvert vaut toujours une vérité trouvée."

I am so far from being offended with any difference of opinion on such subjects, that I rather am inclined to forego mine very easily, especially where I am conscious of a want of knowledge. I should therefore be very glad to have your opinion especially where it differs from mine. Sometimes I suspect however this difference will arise from my having made a mistake in the reference. As to the Jungermannias you have the decided advantage over me of possessing Hooker [33] (the very sight of which at Mr Collins, gave me the greatest delight) & I should in every case bow to de-

cisions drawn from him. Weber's [93] is but an epitome, a small work of pages—without plates. In order to enable you to judge of what might be useful to you I insert a list of all my hepatics. xx prefixed signifies that I have specimens both from Europe & America, x from Europe, +– tropical, & underlined—such as I have undertaken to name—several of which are not in my little book [74]. The sign + shews when added behind, that I would be able to spare specimens tho not always such as are in fructification. Those unmarked are American. [Lists 121].

Of the American Jungerm. &c. you mention I am putting up for you specimens of the following immediately. 1. *trilobata* 2. *connivens* 3. *resupinata* 4. *umbrosa* 5. *quinquedentata* 6. *bipinnata* 7. *pubescens* Of *pallescens* I have no duplicate—of *reptans* no American specimen at all, *pauciflora* is a Labrador species without a duplicate—*Ehrhartiana* I have too little of, which I fear is the case with *oblonga* likewise—but that I will try to send. To these I add *Targionia hypophylla*, *Anthoceros carolin*[*ianus*]—& a small bit of *Anl. jungermannoides* not having any larger—as well as my *Sphaerocarpus* & *Carpobolus* of which as published in the Journal of the Phil. Academy [72] you have taken so flattering a notice.

The following species among your foreign ones—I should be glad to get: *J. Baueri* S. *J. curta* S. *J. deflexa* S. *J. fissa* Curtis, *J. polyanthos* T. *J. varia* S.

Concerning your remarks to my determinations of your *Junger.* I observe that No. 321 *tridenticulata*—may probably belong to *trilobata*—I think the two otherwise very distinct in habit. What I call *trident*[*iculata*] Mx.—is short & branches almost at right angles. As to 366 *Targionia hypop*[*hylla*] I judged merely from the Thallus—the good fructiferous Salem specimen I intend to send, will enable you to decide. 322. *J. capillaris* is to be sure very near the German *trichophylla*—but still would probably be found to differ specifically.—The *viticulosa* of Weber—to which I arranged your No 269—is represented by him without Stipules.—My *J. laciniosa* from Canada differs materially both in size & habit from *sertularoides*—which is certainly very diff. from *trichophylla*. Let me, if you please, know shortly which of the foregoing list of my *Jung.* besides those above mentioned I shall send you & I will directly make up a little packet.

At the same time let me know, if you are in possession of Hedwig's Species Muscorum Frondosorum, Opus Posthum. a Frd. Schwägrichen editum in quarto with 72 Plates [29]—I have chance of procuring it here for the very cheap price of 10 Dollars (at least I think it cheap) & perhaps might get it for 8$. If you, or any of your friends would wish to have it I will get it, and send it on.

Forgive me for troubling you at such length & if you can without inconvenience let me soon hear from you.

I remain with sincere regard

Your most obdt Servt

LEWIS D v SCHWEINITZ

P.S. I am preparing to go largely into the Fungi this year & possibly reattempt the Algae aquat.

TORREY TO SCHWEINITZ

NEW YORK, April 11th, 1823.

My Dear Sir,

I received a few days since your very acceptable letter of the 2nd inst. There is indeed no probability that an expedition will be sent to the Rocky Mountains this season & I have resolved to make myself contented here. It will be in the highest degree agreeable to me to see you in New York should you make a visit in this quarter, but you will doubtless be much disappointed in finding anything worth your notice among us. After being in Philadelphia, New York will appear to great disadvantage. You will, however, see our good friend Mr. Halsey, who beside myself, is the only botanist here! If you are fond of Mineralogy there are many collections among us that you would perhaps be pleased to see. Whether it will be in my power to make a visit to Bethlehem this season, will depend on my not being engaged in more important avocations in July & August next, which was the time I had appointed to spend a few weeks in traveling. At any rate, while I am engaged in Botany you may depend I shall never forget a friend whose acquaintance has offered me so much pleasure as yourself.

By a friend who goes to Philadelphia in a day or two, I shall send, to the care of J. & A. Ritter of Phila. a small package

of specimens I have just sealed up for you. If, however, I should hear from Mr. Halsey of a better opportunity of sending to you, I shall alter the direction of the package. The contents are as follows—

1. About forty specimens of American *Jungermanniae*. These are not all named being sent for the purpose of obtaining your opinion respecting them.

2. Five specimens of European *Jungermanniae*, being those from my Herb. of which you desired specimens—except *J. curta* which will not bear dividing.

3. Twelve specimens (principally of grasses) from the collection made by Dr. James in the Expedition under Maj. Long. These are the only duplicates there were. Wherever there were two specimens I took one for you. I beg you will examine them particularly & give me your opinion respecting them.

4. About thirty specimens of West Indian plants from Perrin's Herbarium, of which I gave you a history when I sent some Cryptogamia from it some time ago.

I regret that it is not in my power to send more by the present opportunity as I can only devote a part of my time to the pursuits of science. In the course of a few weeks I expect to have the pleasure of forwarding another package, in which I flatter myself you will find some things interesting to you.

Your list of *desiderata* in American Phaenogamia is a formidable one, but I will do all in [my] power to make it less so. You must be aware, however, that in supplying your deficiencies from the South, I can be of little use to you except of such plants as Mr. Prince cultivates at Flushing. In Northern plants I can do more for you, though among these there are not a great many you do not possess. But, after all, I fear there are not a few in your catalogue, which neither of us will ever see. There are [a] great many obscure & doubtful things in these books, which I strongly suspect are old acquaintances in disguise. On these I shall make some observations in a future letter.

You enquire whether there is any possibility of procuring specimens of the plants collected by Dr. James in Long's Expden. I answer, that you may get a few through me if you will wait a little patiently. Dr. James is now in this city & has all his plants

with him. There are very few duplicates except of the little rarities he collected on the highest parts of the Rocky Mts. Dr. J. has placed the collection in the hands of his brother here, who has orders to deliver me the whole, should the Doctor not return in one year (he being on the point of starting for the Missouri), or should any accident happen to him in that time. Now as he says himself, there is little probability of his returning to New York within three years, I expect to possess this unique collection, when you may depend on sharing the duplicates with one or two choice friends. I have already taken a dozen of the little things from the snowy regions of the mountains & have determined some of them satisfactorily. Among them are two decidedly new species of *Androsace*, *Rumex digynus* very small & with but two stamens! *Adoxa moschatellina*—or a n. sp. very nearly allied to it, &c. It is my intention to present this *boquet* to some of our societies for publication.

I did not particularly examine the Cryptogamia in Muhlenberg's Herbm. my attention being particularly directed to the grasses & *Carices*. I *believe* the lichens are in a good state for examination—The Algae are very numerous but few of them are determined. I believe I mentioned to you that all (or nearly all) the Lichens marked n.sp. in Muhlenberg' Catalogue [52] are described in Acharius' last work—his *Synop. Meth. Lichenum* [1].

Your list of *Jungermanniae*, is very respectable but I regret that of those which [are] most desired by me, there are no duplicates. However of those which you have so kindly offered to me, I take the liberty of selecting the following which would be valuable additions to my Herbarium [cites 10]. As you receive specimens of which you now have no duplicates, I beg you will remember me.

Is there more than one edition of Hedwig's Species Muscorum, by Schwägrichen [29]? Do you allude to Schwägri[chen,] Sp. Musc. which is only called an edition of Hedwig by the modest author? Whether it be this or not we need the book here, & I have persuaded our Lyceum to purchase it, as I am too poor myself, provided it can be obtained for $8. If you should not be able to get it for this sum, I will add two dollars myself, & send you

the money as soon as I hear from you that the book may be obtained.*

Our Lyceum is in a pretty flourishing state, but we need patronage greatly. If we had a Maclure among us we could do a great dea. I wish you would send us papers—could you not give us something on the cryptogamia?

I had nearly forgot to mention, that among the plants of Perrin is a specimen of a shrub Sprengel has *nicknamed Torreya.* I luckily found a duplicate which I beg you will accept of as an evidence of my particular esteem. I wish you would examine it attentively & give me your opinion respecting its novelty. This plant forms one of a Hexade which Sprengel has described in detail & sent to me to be published in one of our Journals. It is accompanied by most elegant drawings of each species by his Son. I will send you shortly a copy of the figure of *Torreya*—

With renewed assurances of my sincere esteem—

REV. L. D. SCHWEINITZ

I remain—Dear Sir—
Your obed & humble servt
JOHN TORREY

SCHWEINITZ TO TORREY

BETHLEHEM May the 25th 1823

My dear Sir

This evening Mr. Jacobson of Nazareth, an intimate friend of mine, is going to start for New York. I make use of his polite offer to send you the work of Schwägrichen [29] for which according to your direction I have paid 10 Dollars. If you would be so good on receipt of this to call upon Rev. Benj. Mortimer, Fulton Street, you will there either find the gentleman or at least the packet—as I was unable to give him such directions as would enable him to find you, he being a perfect stranger at New York. As he intends to return in a few days it would perhaps be a good opportunity to send me a package if you have any ready. Mr. Dewey has just informed me by letter that he has forwarded one for me to your address. Inside the book you will find my old copy of Index of my Herbarium—thinking it might enable you to point out things which I possibly have in duplicate as

* Since writing the above I have concluded you mean Hedw. Sp. Musc. opus posthum editum. Schw. Lipsic. 1801 [29].

acceptable to you—which would be *instar* a command to send them. Besides you will there find (miserable specimen I fear) the *Jungerm.* you requested in your last. That kind & precious letter arrived here during my absence from home—while I had the good fortune to receive the plants you last sent on my journey at Philad. & enjoyed them greatly. I have since delayed answering from an anxious desire to give you my opinion on the *Jungerm.* sent. Unfortunately my time has been so taken up by urgent duties, that I have not succeeded in finishing their examination. They appear, most of them, to be such as I had seen before—but I shall beg leave, after a while [to] communicate my remarks.

My hopes of seeing you at New York this season are nearly vanished as I shall be under the necessity of making a journey of business to Muskingum in July. Possibly this may however result in the acquisition of a good number of Western plants, as I propose traveling in a manner that will permit botanizing.

I think it needless to repeat how very much I am obliged to you for all your kindness & more especially for the last package. During my stay at Philad. Mr. Say gave me some hopes that you would still join the expedition of Mjr. Long—but I am sorry to have heard nothing further. In my next—excuse my hurry—they are calling me in ten directions—I hope to give you some satisfaction upon the several points your last favor mentions & mean while remain

Yours sincerely

LEWIS D V SCHWEINITZ

TORREY TO SCHWEINITZ

No Date. Perhaps the letter of September 10, 1823, referred to in the following]

)ear Sir

I was sorry to learn this afternoon that your friend Mr. Kum-ıer leaves town early tomorrow morning, as I cannot get ready ›r this opportunity, a package which I hope will be acceptable to ou. Not willing, however, to send Mr. K. empty away I send y him a copy of the 1st Volume of Agardh's Species Algarum [3] hich I a few hours since received from Sweden. Also a copy f the 1st No. of my Flora [89] which I beg you will accept as

an evidence of my esteem. In a few days you may expect another package by the stage in which is the $10. for Schwägrichen [66] &c.—

In great haste, I am &c.—

Yours truly
JOHN TORREY

TORREY TO SCHWEINITZ

NEW YORK. Sept. 11th, 1823.

My Dear Sir—

I forgot, in my hurry yesterday, to request your opinion on a subject to which I beg you will answer me immediately. I I have occupied most of my leisure time, during several days past, in examining a very interesting grass collected by Dr. James during the expedition under Maj. Long. After I had finished my description and drawing, which I prepared for publication in the 1st No. of the Annals of the New Lyceum [88*], I began to suspect my grass was not new, & I have therefore stopped the press while I hear from you on the subject. If I mistake not a specimen was sent you some time since, labelled—"Herb. James. No. 9," but lest this should not be the case I inclose you some of the flowers—with a rough sketch of the plant [†] which I hope will be sufficient for you to make up your opinion respecting it—

The flowers are spiked & heterogamous—*Spikelets* 3 at each joint of the *rachis*, sessile, surrounded at the base by a villous *involucrum*. *Central spikelet* hermaphrodite, 1-flowered. *Calyx* 2-glumed, glumes orbiculate, 2-cleft, 5-bristled between the divisions. *Cor.* 2-valved, hyaline; inferior valve with a short bristle at the top. *Lateral* spikelets male. *Calyx* 2-glumed, 2-flowered inferior glumes with a bristle on one side below the middle. *Corolla* 2-valved, unarmed.

By dissecting the inclosed congeries of spikelets you will see whether I am right in my dissections & description. The genus to which I *fear* my grass belongs (for I hoped it was a new genus)** is *Aegopogon* of *Humb. & Bonp.*, but it differs from that, which has the spikelets pedicellate, corolla with the inferior valve 3-

* [For a sketch of the organization of the Lyceum and its subsequent history see Barnhart, J. H. The first hundred years of the New York Academy of Sciences. Scientific Monthly 5: 463–475. November, 1917.]

† [See FIG. 1, on next page.]

** [Torrey described this as a new genus, *Pleuraphis*, the next year, the type species being *P. Jamesii*, Ann. Lyc. N. Y. 1: 148, pl. 10. 1824.]

FIG. 1. Torrey's sketch of the grass mentioned in his letter which he described later as *Pleuraphis Jamesii* Torr. now known as *Hilaria Jamesii* (Torr.) Benth.

awned & the superior 2-awned—the male spikelet resembling the hermaphrodite one except in the pistil &c.

From AMPHIPOGON of *R. Brown* it differs in not having a spiked *panicle*, in the exterior florets of the spikelets not having an involucrum, &c.—

From the genus *Lycurus* of *Humb.*, which has the spikelets geminate, one of them ♀, pedicellate, the other ♂ v. n., subsessile & resembling the hermaph. though smaller &c.—

A. a sketch of the plant
b. congeries of spikelets
c. the same expanded to show them more distinctly
d. a glume of the hermaphrodite spikelet
e. corolla of the same
f. —— inferior valve
g. superior valve
h. stamens
i. pistil
k. spikelet of male florets—
l. inferior glume—showing one of the margins involute & armed with a bristle about half way down
m. superior glume—one of the nerves produced into a cusp
n. corolla
o. inferior valve
p. superior valve
q. stamens
r. rachis—

Aegopogon cenchroides of H. & B. comes near our plant by the description but yet differs sufficiently to be at least *specifically* distinct. To the other species of this genus (several of which are described by Lagasca in his Nov. Gen. & Sp. [42][under] the gen. name of *Hymenothecium*) it has little affinity.

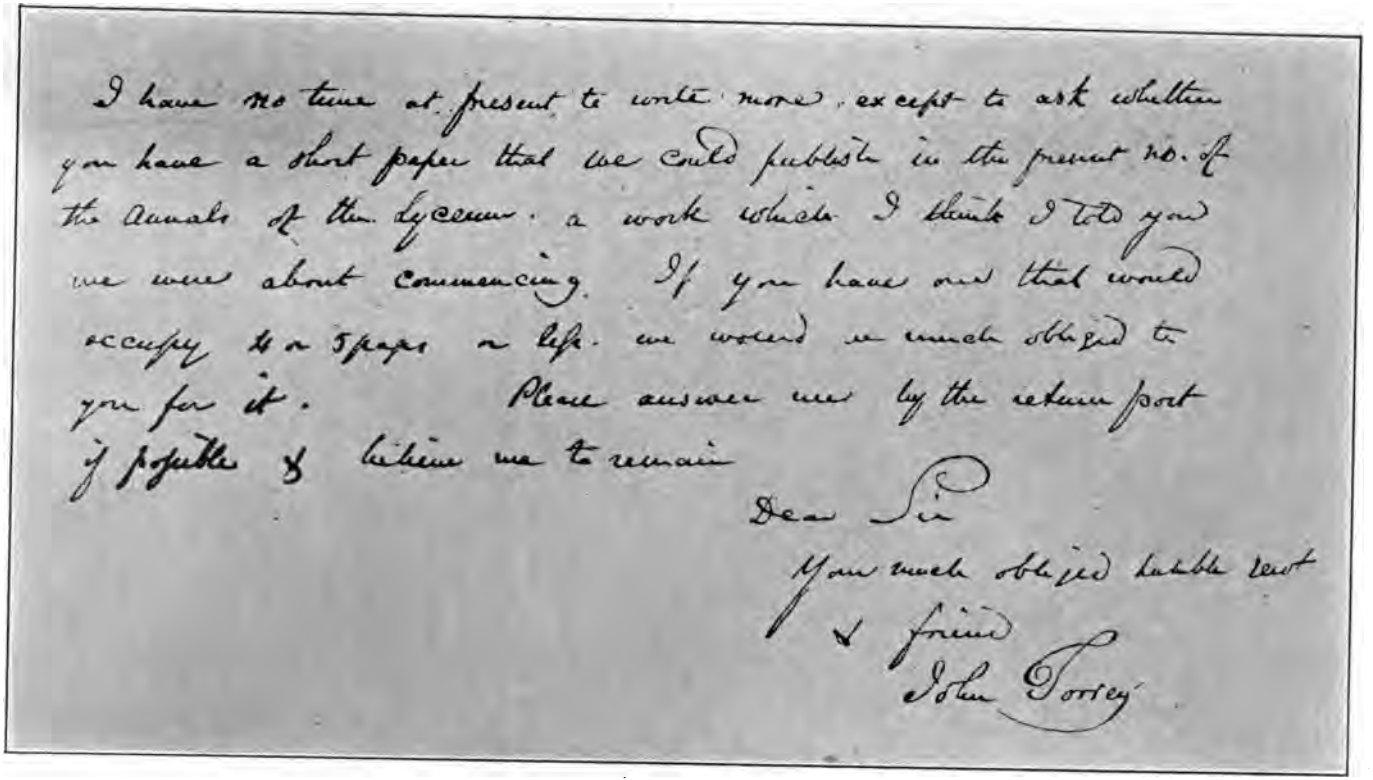
I have no time at present to write more, except to ask whether you have a short paper that we could publish in the present no. of the Annals of the Lyceum, a work which I think I told you we were about commencing—If you have one that would occupy 4 or 5 pages or less we would be much obliged to you for it & Please answer me by the return post if possible & believe me to remain

Dear Sir

Your much obliged humble servt & friend

JOHN TORREY

P.S. I am preparing a package for you to go by the stage in a few days. Mr. Halsey hopes to be able to add something.



I have no time at present to write more, except to ask whether you have a short paper that we could publish in the present No. of the Annals of the Lyceum. a work which I think I told you we were about commencing. If you have one that would occupy 4 or 5 pages or less. we would be much obliged to you for it. Please answer me by the return post if possible & believe me to remain

Dear Sir

Your much obliged humble Servt & friend

John Torrey

FIG. 2. Portion of letter of Torrey to Schweinitz, page 182.

SCHWEINITZ TO TORREY

BETHLEHEM Sept. 16th 1823

My dear Sir

This moment I receive your kind letter of the 11th & am the more eager to answer it immediately because I greatly regret that you took the trouble to apply to me, upon a doubt, which I am so entirely incompetent to decide, as it retarded your work. I have never paid anything like sufficient attention to the analysis of the Grasses (the Carices excepted) to enable me to give an opinion; least of all concerning the identity of [a] Genus—it is a part of the Study of Botany which I have still in view—Besides I am unprovided with the works in which the genera are analysed. Excuse me therefore in not being able to be of any service to you in this respect. Neither of the Genera to which your interesting grass (of which you certainly kindly sent me a specimen) might belong is at all known to me.

My long absence has prevented me from writing the little articles which I had intended—I hope to be able to prepare some during the winter—with which I shall trouble you for the Annals of the Lyceum if found worthy. I am at this moment busily engaged with my monography of the American carices [71], which however becomes too voluminous to be printed in a Journal. I shall therefore, if you permit me, take the liberty, when finished to send you the manuscript, together with my Volume of Carices for use & inspection—especially in reference to your Flora [89]. I cannot describe the pleasure which its perusal gave me, nor sufficiently thank you for the present. Unless you forbid me, my next will contain a sheet of remarks upon it*—together with the few additional plants if any, which I have found in the region it includes—I intend to subjoin a list of the plants in this vicinity to enable you to send for any you may wish to see for your work—if I have no specimens to spare I wish you at least to see such as may be of use—& there is not one in my collection which I should not be glad to send you for examination & recognition.

It will not be uninteresting to you to be informed that the *Gerardia auriculata*—hitherto only found by Dr. Darlington in Chester

* Not upon the Genera of Grasses however—for unfortunately I have only a kind of knack-knowledge of them.

county, has this year been found in quantities by the young students at Nazareth. Specimens are at your command. It is not a *Seymeria*—as Nuttall supposes. Apropos, the *Seymeria macrophylla* I found rarely on the Muskingum river during my Journey.

The receipt of Prof. Dewey's Carices [19] gave me inexpressible pleasure & has been of great use to me in my present work. I most eagerly expect the package you promise. Please to let me hear from you as soon as convenient & believe me, with great gratitude for your valuable presents, Your humble servt & sincere friend

L D v SCHWEINITZ

P.S. How is it, that Elliott's numbers [22] do not appear? He wrote me that three would be forthcoming in May.

Would not a comparison of the Asters & Solidagines in my collection, with yours, be a good assistance when you come to that part of the business in the Flora [89]—You are welcome to consult my stores—as we are not so far distant from one another as to prevent my sending my whole collection to you & I think nothing more useful than such comparisons.

SCHWEINITZ TO TORREY

BETH. Sept. 21st 1823

My dear Sir

I take the liberty to enclose [*] you this day my very unimportant remarks upon your excellent Flora [89]—do me the favor to let me know your sentiment upon them.

I have almost completed my Monography of the Carices [71], of which I intend to make a Copy as soon as possible—in as good writing as my unlucky hand permits, to present to you in manuscript. But I wish to make an enquiry concerning the Journal of the Lyceum—my head almost runs crazy with the astonishing effects of a perfectly new (at least to me) analytical method of distinguishing the plants of a numerous genus, by analytical tables, which if well executed, cannot fail of determining the species. The idea was I believe first operated upon by De Candolle & Lamarck—& I have just received a Flora of Northern Germany by one of my most intimate friends there, Mr. Peter Cürie [17]— in which that plan is pursued thro out—I instantly applied it to our Carices,

* [The enclosure is printed at the end of this letter.]

& find it answers admirably. Now my enquiry is, whether your Journal would admit such an analytical table [67] of all the American Carices—about 100 in number which I know of—by means of which every person that is only slightly acquainted with the terminology—shall be almost with absolute certainty enabled to find, of any given *Carex* in his hand, whether it is in the table or not, & if in, what name the author of the table calls it by. These names will then refer to the authors who mention the *Carex* for ample descriptions—or, as regards the new ones established by me, to descriptions, which might follow in another number. The table itself would not take more than at most five leaves in an octavo book—If you are unacquainted with this method, I am sure its effects will please & astonish you. In case you thought such a table admissible (with short directions for its use) what would be the latest period for sending it to you?

Let me beg you, when you put the promised package of plants into the stage, to give me information thereof at the same time by way of Philad.—with a few lines, that I may enquire for the package at Easton—

With sincere affection

Your most obliged Servt

LEWIS D v SCHWEINITZ

REMARKS UPON DR. TORREY'S FIRST NUMBER OF A NORTHERN FLORA

The plan and its execution are equally excellent. As regards its coincidence with Elliott's Sketch and Nuttall's promised Western Flora to form a complete account of the plants of the United States—I only regret that Mr. Elliott has confined himself to South Carolina & Georgia. The two intermediate states, Virginia & North Carolina, more especially the latter with its high mountains & remarkable swamps, leave a gap of some consequence, which ought to be filled up. I presume Dr. Torrey does not include Labrador, Canada, etc.

I shall now proceed to remark upon the Genera & species in their Order; not mentioning those I have nothing to say to.

Salicornia herbacea or *virginica;* of these I have never seen specimens & beg for some.

Hippuris vulgaris. I have American spec. only from Labrador—& these are altogether identical with numerous European specimens—so that I do not believe in the existence of another Am. species.

Callitriche verna β intermedia. I believe to be the same with *heterophylla* Pursh—but think the latter name more appropriate.

linearis Pursh which I have found in N. Carol. rarely—& had beautiful fructiferous specimens from Cherokee Country—is not at all the same with *C. autumnalis* of Europe. The *autumnalis* of Europe is certainly different I think from *linearis*—I can send you specimens of both—which tend to prove it.

terrestris. I have much doubted the specific difference of this from *heterophylla*—since I observed a spot, where the *heterophylla* was floating, dry off & exhibit undoubted *terrestris*, shortly after, on its dry surface.

Blitum; all the spec., as American, are unknown to me & desirable, especially *maritimum*—as I have spec. from Europe of the others.

Ornus. I wonder by what means one could get at this fabulous tree.

Veronica Beccabunga. I have found in Ohio—exactly the European—what is here called *anagallis* is certainly not the true European one—I have called it *intermedia* var.

Veronica reniformis Raf. cannot scarcely be different from *arvensis.*

Gratiola virginica. Taking the *neglecta* for the true Linnean *virginica*, that of Elliott, which is manifestly distinct—& has been found by me here at Beth.—& by Capt. Leconte on Schooley's mountain [New Jersey] ought to be distinguished by another name—perhaps *Elliotti*—& inserted. Have you no Northern specimens?

megalocarpa.—greatly desired—

Lindernia dilatata you say is much rarer than *attenuata.* The latter I have never found in Pennsylvania. The former is in great plenty on the shores of the Susquehannah—Harrisb[ur]g.

Catalpa. With your leave—is not the word *south* in the Hab. a misprint for *north?*

Justicia pedunculosa. Capt. Leconte maintains that the southern *pedunculosa* (which I have never seen) is very different from this—which is very common on the Susquehannah at Harris-b[urg], found in full flower beginning of July, 1823.

Utricularia setacea—our Salem N. C. specimens are most generally 2-flowered.

Utricularia purpurea—I long to see.

Lycopus Europaeus β angustifol. Do you really think that the *Lycopus europaeus* which you kindly sent me, & which grows here plentifully—is the same plant with *L. angustifolius?* This I have never found branching, or at least only at the base, & then it sends up long stalks often 4 or more feet high, with leaves all alike. The *europaeus* you sent me is certainly not different from the European specimens. I found a very curious tall branching one on the Muskingum which agrees very well with Elliott's *sinuatus*—& European specimens of *exaltatus*—& differs entirely from *europaeus.*

I have no doubt the *L. uniflorus* of Muhlenberg is not a separate species—possibly the Canadian plant of Mx. may be different.

Monarda didyma; of this I found fine specimens in Ohio very near the Pennsylv. line—and most splendid ones of Pursh's *Kalmiana* branching exceedingly on the Laurel mountain, Pennsylv. I agree with you that there is no specific difference.

The *M. punctata* so extremely common in N. C. I have not met with here, the *M. hirsuta* is found on the Allegany mountains. The latter is called *Horse mint* in Ohio, where it is a great nuisance in wheat and rye fields, communicating its taste & smell to the grains.

Salvia Claytoni—have you seen that plant? & where can it be got?

Circaea lutetiana β canadensis. I have not seen here—it is rare in N. Carol. but common on the west side of the mountains in Penns. & Ohio.—The species which grows here plentifully is the *C. intermedia* of the German botanists—to be sure the specific difference is not great & consists in cordate opake leaves—& smoothness—After all I think there are but two real spec. *C. lutetiana & C. alpina.*

Lemna minor—you say is common through the U. S. I have diligently sought it—& never found it.—*L. gibba* I have here & in New Jersey, as well as *trisulca & polyrrhiza*. It is curious that with all possible pains I never succeeded in finding any species of *Lemna* in North Carolina.

Pedia radiata as described by you perfectly answers the specimens I find here. But what I called so in North Carolina is very different. It grows about two & three feet high—The Corolla has not the slightest tinge of blue—the stamina are not much exserted & the Leaves semiamplexicaule & always deeply and lacerately dentate below; sometimes these indentures are even auriculately produced.

ris versicolor. I felt sincerely obliged to you for the successful attempt to put an end to all my vexations concerning this *Iris*—& I gladly assent to your reunion. But when you join the *prismatica* of Pursh & *gracilis* Bigelow—as the true *virginica* of Linnaeus—which is certainly correct—I except from this union my *prismatica* of North Carolina, which I had long suspected not to be the same with Pursh's. That has a very long greatly flexuose stem, winding to the height of five feet, & by no means flowers only in a terminal raceme but several lateral branches.

re you unacquainted with the *Iris cristata* and *Iris verna*—differing extremely in habit & marks—& both equally common in N. Carolina, the first on hill sides—& the last (which approaches nearer to the *lacustris* you sent me than the former) in burnt woods not in tufts but always separate—& extremely odoriferous.

yris brevifolia was found this year on the Bushkill by the students at Naz[areth] & differs very materially from *X. flexuosa* Ell.—I think you ought not to have united *X. caroliniana* with that.

Isyrinchium. I suspect you have not before you the same species which I have called by these names (to which I subjoin a third found near the Catawba covering whole meadows—answering *bermudianum*) because you seem to describe the leaves & scapes in both species as extremely similar.—In mine they are uncommonly different—the one answering your description—the other two not at all. Yours I have probably not

distinguished from one another—but shall attend in future. If you please, let me send you specimens of my two broad leaved species from N. C.

Kyllingia monocephala grows here at Bethlehem. On the grasses I can make no other observations—on account of my superficial knowledge—except mentioning which I should be glad to secure.

Scirpus pusillus Vahl—not known to me.

caespitosus β. callosus Big.—do.

subsquarrosus—do.

spadiceus—do.

Schoenus mariscoides. I have a grass from Georgia which I have arranged under this name which appears to be a congener of the *Cladium Mariscus* of Europe.

Rhynchospora fusca R. & S.—has this grass been really found in Am.?

Dulichium canadense.—I have found a grass in appearance like *D. canad.* in the Lehigh Gap—Whether distinct enough to constitute a species I will not decide.

Cyperus dentatus—unknown to me.

Cyperus virens or one that I call so—& a very distinct species, is common here on the gravelly river shore.

Cyperus flavicomis.—I am pretty sure that I have found it here.

Spartina cynosuroides.—Can the tall ten foot high plant which I have found in the rich plains on the Muskingum be the same with that of your salt marshes?

Paspalum stoloniferum.—I have specimens from European gardens & certainly never saw anything of the kind in Am.

Milium effusum. I have found wild (it is not cultivated there at all) in North Carol.

Aristida purpurascens I should be glad to see in order to ascertain whether certain suspicious ones I find belong to this species.—Your description does however not the least agree with specimens of *racemosa* derived from Muhlenberg.

Trichodium montanum. Let me see.

Agrostis stricta.—I am glad you could not find it more than myself. —God knows what is meant.

A. compressa—quite unknown.

A. juncea I think I have found.

A. longifolia as distinguished from *clandestina* I long to see. The latter I found at Harrisburg.

Arundo coarctata, *brevipilis* } would be very acceptable.

Crypsis virginica I long to see in order to disting. fr. *Agrost (is) virginica.*

Glyceria acutiflora do. do. from *fluitans.*

maritima—do.

pungens of Elliott I can furnish you. It grows here.

serotina.—I do not understand what you mean by this species, citing the *P. palustris* of Muhl.

Festuca fasciculata [*fascicularis*]—would be very acceptable.

Ceratochloa unioloides—ditto.

Diarrhena americana—I find by your descript. that I must have altogether mistaken this plant—and should be glad to get it.

Trisetum purpurascens I should be glad to see.

Avena praecox.—Should the citation of Pursh not be *Aira praecox?* I desire it.

Aira flexuosa, *aristulata*, *pumila* } are quite unknown to me.

Lolium.—I have found a remarkable *Lolium*—with sometimes furcate spikes—on the highest summit of the Allegany mountains—not yet examined.

Atheropogon apludoides—is not rare here at Beth.—often three feet high.

Panicum pedunculatum—unknown to me.

macrocarpon—I desire it because I am doubtful about mine.

involutum, *depauperatum* } both unknown to me.

At Bethlehem I have found a *Rhynchospora*, which you do not describe, which would be the only northern plant I know of not in your book.

The following is a list of my desiderata [lists 33 of the species named above, in reverse generic sequence] and beg to ask whether you want specimens of the following [lists 9].

SCHWEINITZ TO TORREY

BETHLEHEM. Sept 25th 1823

My dear Sir

I am afraid you will not only be astonished but vexed to be plagued every week with a letter from me—but I can't help it —I am so very desirous to let you see my Analytical Table of the Carices [67], concerning which I wrote you in my last, that I can't find it in my heart to lay it by & send it to you inclosed, with the request to be so good as to make trial of it, & to let me know what you think of the Idea. I consider it a most extraordinary improvement in the art of treating so extensive a Genus. To be sure it is necessary to refer to more detailed & full descriptions in order to become fully acquainted with any particular species— but as for finding & recognising, what the author of such a table calls any particular Carex, &c. &c.—I conceive nothing can be more certain. You will observe that there are about 25–26 species in this table which I have attempted to establish as new—Of these & some others imperfectly described by Michaux & Muhlenberg, &c.—I think detailed descriptions would not take up much room.

As to giving the Table a place in your Journal—I leave it altogether to your discretion—& beg you to keep it at all events as an Index to the manuscript copy of my now finished Monography which I intend to send you as soon as copied.

If the table should be printed—then your Journal in future would be the proper place for the detailed descriptions of the thirty species about—which I think it would be necessary to give. To these I could perhaps on two octavo plates—add drawings of the principal parts of the described new Carices—It would not be practicable to give drawings of them in full—upon less than 12 or thirteen plates which is out of the question.

In case for any reason whatever the table is not admissible in your Journal, only let me know—but do not send it back for I am sure you will find it of use, when you get to the Carices & do not forget my offer of sending you for inspection & examination my whole Collection of Carices (which contains about 150 species) whenever you want it—so as to be not an unreasonable time out of my hands. I am with sincere sentiments of respect

Your most obd Servt & friend

L D v SCHWEINITZ

P.S. The *Carex subulata* you formerly sent me is beyond all doubt the *C. Collinsii* Nuttall—this does not prove it not the *subulata* of Mx.—However, as I found one on the Allegany Mts.—which answers Mx. descript. equally well & has not that curious formation of the rostr[um] mentioned by Nutt. and not by Mx.—I have given the name *subulata* to this.

TORREY TO SCHWEINITZ

NEW YORK, October 15th 1823.

My dear Sir

I have neglected answering you so long that I should not wonder if you were altogether out of patience with me & no longer consider me as one of your correspondents; but did you know my dear Sir how little time I have to sit down leisurely & attend to my favourite pursuits, I am sure you would excuse me. It was my intention not to write to you until I sent the little package of plants I promised so long since, but I have delayed sending this until I could review all my *Carices* and add to the package such specimens in my collection as it appeared to me you had not seen & also some doubtful ones: but lest you should think I was not in the land of the living I write now a short epistle. The little things shall certainly be sent in two or three days at farthest. Now to answer your letters of which there are three to which I have not replied. *1st, Sept. 16.* I was indeed sorry that you could be of no assistance to me in determining that Rocky Mountain grass. Can it possibly be *Aegopogon*? I have written to Mr. Nuttall to examine whether there is a plate of the plant in Humb. & Bonp.'s large work [39] of which there is a copy in Boston. Roem. & Schult. [48] do not quote any & their account, copied from H. & B. is not sufficient to settle the question—I can learn from Paris in the course of a few months, & will wait that time rather than make a blunder. Your offer to send me Asters & Solidagos I most eagerly accept—I expect to have much trouble with these abominable genera—Who will undertake monographies of them!—*2nd, Sept. 25th.*—How delighted was I with your synopsis of the *Carices*! [67] It is indeed a very useful performance. I have examined it a good deal & find it of much advantage in the determination of species, but you will not be offended at a remark

or two which I shall make. The great objection to studying the *Carices* in the analytical way is the very variable character of many of the species. So that it is in many instances difficult to say to which of the two divisions of a series the specimen under examination belongs. To No. 4. 6. a considerable no. of species will often be referred when in fact they belong to different series, etc.—But I will in my next letter say more on this subject. I have at least 6 species to add to your Catalogue—viz. *C. alba* from mountains in Massachusetts. *C. xanthophysa Wahl.* (*C. follic. β. xanth.* Muhl. p. 244) (but can this be your *striata*?) *C. lenticularis Mich.* a species from N. England & N. Y. very much resembling *limosa*. *C. Bigelovii* a new species from the White Hills of New Hampshire. *C.* —— n. sp. from Cape May, given to me as a n. sp. by Collins!! Also a fine species from the Rocky Mountains & another found by Nuttall on the Arkansas, besides some doubtful ones.—These I will send you, but having no duplicates of several of them, I must beg to have them returned.—In your list at the end of the table *C. saxatilis* is omitted. It should be No. 52½. If I were in your place I would omit all the European species of which Pursh gives habitats except those which I had seen myself.—Such as *C. arenaria, divulsa, leporina, remota & distans*. Pursh evidently knew nothing of the *Carices*, any more than he did of the *Grasses*, & has put down many species at random! Michaux's synonyms are also very obscure—Who knows his *scirpoidea, ovata, miliaris*, etc? You are aware, I presume, that *C. Lagopus* of *Muhl.* is the *C. Fraseri* of *Ph. & Bot. Mag.*! We have it here in a garden, but unfortunately I lost the opportunity of either seeing it in flower this season, or of obtaining a specimen for my herbm. I do not know how Pursh could have made such a mistake as to call *C. Fraseri Mapania*! See what Nuttall says.—We intend to publish your paper [67] in the 2nd no. of our "Annals" as soon as it is revised. The manuscript you sent me I shall probably return to you with my remarks—but I beg you will do me the favour to let me keep it at length—

A few days since I received some charming Nepaul Crypts from Hooker & in my bundle was a small package for you containing a copy of Greville's Cryptogamic Flora of Scotland [28]—12 nos. a beautiful work—I could not resist the temptation of taking a

peep at it which I hope you will excuse—In the package was a letter from Hooker & as I would have wished you to do in a similar case I send it on by mail as the bundle might not reach you in a week. Hooker writes me that he wishes to correspond with you—& offers Nepaul & other fine things.—This has prevented me from dividing such of my specimens as would bear the operation, knowing you would get much better from the Prof^{r}. himself. Really it would make *your mouth water* my dear Sir to see the odd & charming things! Have you the Musc. exot. [Hooker, 35]? I told you, I believe, that the generous author had sent me a copy. This gentleman has made remarks on 240 crypts which I sent him last Winter.—Where his determinations differ from yours I shall take the liberty of mentioning them. It will only be in my power now, however, to mention some of his names of our *Jungermanniae*. *J. sertularoides* & *laciniosa* are only *J. ciliaris*! I never could find the difference between the two former—*J. tridenticulata Mich.* is *J. trilobata*. *J. capillaris* is *J. trichophylla* Brit. Jung.—Several which I sent you but whose names are not yet returned, have been named by Hooker. No. 282 is *J. bidentata* 284-*crenulata* Hook. Jung. 281 ("J. nov." Schw.) is *J. trilob.* *β minor* Hook. Jung.—Our *J. bicuspidata* (Flushing) is *J. bident.* *var. min.* No. 321 which you called *J. tridenticulata* is *J. 5-dentat.* Hook. Jung. (*J. barbata* Schmid.). No. 323 ("J. scalaris" Schw.) is *J. sphagni* with gemmae. We are doing a little in botany here, but want time badly—Halsey has made some additions to his Lichens. We shall have a good fellow to add to our number in 2 or 3 weeks in our friend Cooper, who is returning from his travels in Europe.—

More anon—

Believe me my dear Sir your devoted friend

L. D. SCHWEINITZ Esq^{r}. JOHN TORREY—

P.S. I think it best not to send your monograph [71] until we agree about the synopsis [67]—then I should be very glad to examine the former by your specimens if possible. I know you will not be offended if I speak freely about it. We shall, probably, not always agree about *species*—I am for reducing the number a little.—I had almost forgotten to reply to your 3rd unanswered letter which, indeed, was not the least acceptable for it contained

your remarks on my Flora [89]. You may be assured my dear Sir I duly appreciate your kindly feelings towards me. I wish it were possible for you to see my manuscript as fast as I prepare it for the press (for I have only *notes* prepared—the copy for the printer is written out as fast as it is demanded) but this seems impossible, from the great distance between us. Of the species which you desire I can procure you a part—but not all, as there are several which I should be very glad to see myself, such as *Aira pumila Ph., Ceratochloa unioloides* & *Gratiola megalocarpa.*— Do by all means let me have the plants you offer,—particularly your *Fest[uca] diandra.* In my next I shall reply to some of your remarks—

J. T.

SCHWEINITZ TO TORREY

BETHLEHEM Nov. 1st 1823

My dear Sir

Yours of the 15th ult. gave me the most sincere pleasure, & I beg to thank you in a particular manner for devoting a part of your so much occupied time to a correspondence which I am so sensible cannot be half as interesting to you as it is to me. No less obliged do I feel by your remarks concerning the *Carices.* Indeed I am anxious to add the species you mention to my analytical table [67] as well as to make some necessary corrections. To you who are so intimately acquainted with the Graminae it may appear an inexcusable superficiality & indeed I blush to own it— but still relying on the French adage "Qu'une erreur découvert vaut toujours une vérité trouvée" I must do so—I find that I stumbled grievously on the very threshold (but I hope in that one instance only so badly). For upon a closer examination of my *Carex leonina*—I have made the discovery that it is no *Carex* at all but most manifestly your *Scirpus planifolius.* It is astonishing how easily one is sometimes misled by a prejudice that once takes possesion of the mind. Not having the smallest doubt of its being a *Carex* I neglected that part of the analysis which, when undertaken afterward at once convinced me of my mistake. But let me make a remark upon your objection to the analytical way I propose. I am perfectly sensible of its imperfections & that it by no means suffices to give a full & clear idea of a species.

I only intend it as a means of facilitating the mutual understanding between different botanists of the identity of the plants they are examining, & of making beginners generally acquainted with certain species—as such I am pretty sure it will prove itself of some importance. As a proof I mention that Collins who made very light of my table when I showed it to him, according to his private way of doing business, kept it by him, & examined his dubious species by it—& owned after he had shewn me some of these & asked me how I would call them, that he had made out the same names exactly by my table. Perhaps another instance may be your suggestion, that my *Carex striata* is the *xanthophysa* of Muhl.—which I am very much inclined to believe (altho I see no male florets at the summit of the female spikes). If so that *Carex* is however ill described. I cannot entirely agree with you as to the *great* ambiguity of the subdivision—as soon as the precaution is used of having a good number of specimens before you. The slighter or greater variations in these appear to me almost always to indicate the true rubric with sufficient certainty. Besides by extending a principle I have in a few cases adopted—the remaining difficulty might be altogether obviated by contriving so as to lead the examiner right, which ever way he might happen to choose in cases of ambiguity. At all events I shall follow your advice, & leave out all Pursh's unconfirmed Europ. species. I was not aware that the *C. lagopus* of Muhl. is the *Fraseri* & am much obliged to you for the notice. I should very much like to get it. Solomon Conrad to whom I gave a copy of my Table for his own use—would insist upon striking off copies in order to be comunicated to Botanists—I have written to him not to do so—at least not till it has been corrected. If you actually think it worth while inserting (after correction & augmentation) into your Annals I think it ought to be in that work, that the descriptions of my new Species should appear. You have not answered that part of one of my letters in which I propose sending you my great mass of descriptions for use when you are about that family in your Flora [89], not only, but likewise my whole collection of *Carices* for comparison—I should not mind its absence for two or three months. Such likewise would be my proposal about the Asters & Solidagines. I feel altogether incom-

petent to undertake anything like a monography of these—but should be glad to assist a better hand, by a view of my very numerous specimens.—Write to me explicitly whether you wish me to do so—& I will put things into such a condition—that at a moment's warning when you want them—the whole mass may be sent to you.

You may easily judge how impatient I am to get Hooker's present—& to enter into the correspondence he desires. Will you undertake to forward to him, what I wish to send holding me acacountable for all expenses? I believe I can in a short time make up a very good number of Fungi—which he seems to desire.

This promised work of Greville's [28] makes me long still more for the package from you—which week after week fails to arrive. I do not blame you—because I know by my own experience how little time is left to a man of business for these things—but I can't help telling you how much I desire to receive the little & the large things you promise.

Believe me yours most sincerely

LEWIS D v SCHWEINITZ

P.S. Please to deliver the inclosed to Mr. Halsey whose direction I have inadvertently rendered illegible by a careless opening of the seal of his last.

SCHWEINITZ TO TORREY

BETHLEHEM 27th Jan. 1824

My dear Sir

Knowing how much your time is occupied I by no means intend to complain that I have not heard from you (except by deeds of invaluable kindness—in the loan of your curious *Carices*) for so long a time. But I feel the necessity of improving the recovery of my health, which for weeks past has been such as to incapacitate me from any useful exertion, by indulging my mind with such occupations as are most likely to give it pleasure. And none can do so more than a correspondence with you. My last communications were in the same indirect mode with your last ones. In the box I sent to Mr. Halsey I not only returned you the *Carices* so kindly sent, but attempted to shew you my gratitude for the favor by adding a small number of plants which I conceived might be agreeable to you. I confess I long to hear

your remarks upon them. In the same package (besides a small one for Prof. Dewey) I sent you with a request to accept it as a token of friendship a copy at full length of my remarks on the American Carices [71]—When you have had time to look it over—I should certainly feel desirous to hear your observations upon it & whether you conceive it in part proper to be communicated to the public. The latter part of last week I took the liberty to address to you a pretty large package for Dr. Hooker, Glasgow, containing Am. Fungi—but was then unable to accompany it with a letter. My request is, that if you know a way how to forward it, to be kind enough to do so—if not, to let me know & to keep it by you, until I am able to point out how it is to be sent. I delivered that package into the Easton stage office & directed it to the Care of Mr. Halsey—because the stage driver is in the habit of delivering packets there. If you could find time to advise me of its arrival I should be very glad.

I do not doubt you are very busy in the prosecution of your great & valuable undertaking. How far will the next number bring us? I am much obliged to you for the publication of my Table of Carices [67]—tho' I am sorry that it necessarily is broken off in two numbers—which however cannot be of any consequence when the volume is bound together.

Be so kind as to take this letter as it is meant only as a friendly attempt to remind you of me & to assure you that I shall ever be most sincerely

Yours

LEWIS D v SCHWEINITZ

TORREY TO SCHWEINITZ

NEW YORK, Feb^{y} 15th 1824

My Dear Sir

You would treat me no better than I deserve were you to erase me from the list of your friends, for indeed I have forfeited all claims to be considered as one of them. There is now before me a fearful pile of unanswered communications, & I have begun to clear them away this day. I begin with you, to whom I am under the greatest obligations in every point of view. The whole business of apology I shall dispense with & proceed at once to the subjects most interesting to us.

Your letter of the 27th ult. I received a few days since. It grieves me to learn that your health is not good, but I hope it will soon be restored that you may attend both to your duties & to your favorite scientific pursuits. The *Carices* I sent you some time since, were received safely in Mr. Halsey's box, & so also were the specimens kindly intended for me & the invaluable History of N. A. Carices etc. [71]. The package for Prof. Hooker unfortunately came 2 days too late, a vessel having just sailed for Glasgow. I however mentioned in my letter to the Prof. that something from you was hourly expected for him, & that if it arrived too late it should be sent by the next opportunity. Another vessel will probably be ready in two or three weeks; if not, I can send it by the way of England. Mr. Halsey has it in safe-keeping.

I have just looked at a proof of the continuation of your *Carices* [67]. It does not altogether please me, though I have in a few instances used the authority you gave me to make alterations which appeared necessary. I wish exceedingly that one or two names were changed, v. in particular *muskingumensis* & *granularioides*. Is not the latter contrary to the Linnaean rules? Halsey & myself had a great mind to take liberties here, & I don't say we will not yet if the sheet is not printed off. In the 4th No. of our Annals we propose to give some of the new or rare species from your Monography, for to give the *whole* would be inconsistent with the plan of our work. Mr. H. will make drawings of the new ones, unless you could have them done under your own inspection. If you could do so, & will mention the species to be first described (i.e., the rare & new ones) they shall go to press as soon as the 3rd No. is printed.

My Flora [89] is printing slowly, but pretty regularly. The 2nd No. is published, & 100 pages of the 3rd. I am now in Octandria, Trigynia, but the printer has copy to the 3rd or 4th genus in Decandria. It appears to me that the whole work will be finished (if my life & health are spared) by September or October next. This time will be necessary to make the necessary typographical corrections, the nature of the work precluding the possibility of rapid & at the same time correct, printing. There will be probably 1000 or 1100 pages in all. The cryptogamia, exclusive of the ferns must be taken up in a separate volume: but by the time

I arrive at this class I shall doubtless have the pleasure of quoting your N. A. Fungi, & Halsey's Licholog. American.!! The Algae will give me some trouble & they will be in the smallest number of any of the orders.—You may well suppose that I have but little time, after attending to my book & some little practise of medicine, besides an occasional look (for I can't help it) at the curious things in mineralogy that are daily brought in. But having made some arrangements in my concerns, by which I have more leisure than formerly, I shall again endeavour to be punctual in my correspondence & at least to write you a letter once in two or three weeks & to exchange specimens of plants with you.

I think I mentioned in former letter that Mr. Cooper, one of our old botanical friends, had returned from his travels in Europe. He wishes to take up some little-known department of N. American Botany, & I advised him to let it be the Class Syngenesia. Do you think of any other field which he could cultivate more profitably? Should he engage in this or any other botanical subject, I hope you will find leisure to correspond with him.

I will now make some observations on the grasses etc. of your last package.

1. "AGROSTIS *erect. 6 feet high*" It appears to be *A. sobolifera*, though I never saw that species so tall.
2. "POA. Beth." This, if not a var. of *P. nervata*, is new to me.
3. "*Festuca diandra*" is *F. nutans* of my book, & of Muhl. herb^{m}. It differs some from *Fest.*
4. "*Rhynchospora nigra.*" Not in my book. I am not yet satisfied whether it is new or not.
5. *Cyperus virens.* Think you this sufficiently distinct from *C. parviflorus*?
6. "*Sisyrinchium anceps* aut *Bermud.*" This differs a little from my *anceps* but is very distinct from my *mucronatum*, of which I can probably send you a specimen. I have a very narrow-leaved kind collected by Delile in Georgia. What can it be?
7. "*Cyperus vegetus.*" New to me, but you are probably right.
8. —— *punctatus* Ell. very acceptable—as well as 9. *Rhynch. cymosa* from *Beth.*
10. *Dulichium canadense:* Surely not distinct from *D. spathaceum.*

11. *Cyp.* "*flavicomus.*" This is what I have supposed to be *C. strigosus.*

12. *Carex hystericina*! This surprised me—I should certainly have called it [*C.*] *Pseudocyperus. C. hystericina*, as I have determined it, is a very different plant.

13. *C. costata.* I can hardly distinguish it from *C. virescens.* Do you find its chara^{ts}. constant?

14. *C. muskingumensis.* Very near *C. lagopodioides*—

15. *C. cristata.* I am glad that thing is settled. 'Tis common in N. Eng^{d}. & I never k[new what] to do with it.

16. *C. straminea.* This speci^{n}. has but 2 spikes. Is that common? The other species I believe we have settled before.

The *Carex* we call *xanthophysa* is most certainly *C. folliculata* as fig^{d}. by Rudge in Lin. Trans. [65] & as Smith says of Herb. Lin. as he compared the specimen I sent him. So that *C. follic.* of Schk. & *Muhl.* may be disc^{d}. The one you labelled *C. striata* I cannot make different. The one resembling it, with distant spikes which I supposed to be a var. of *subulata*, though much larger, was among Muhlenberg's specs. as a var. of *folliculata!* I am so perplexed with these things, that I am almost in despair of ever being able to distinguish the species with certainty.

If you have specimens of the following plants or can give me descriptions of them for my Flora, I should never forget the favour —*Hydrangia vulgaris* Ph. *Mitella reniformis. Silene nocturna. Sedum telephioides. Cerastium semidecandrum* Muhl. *hirsutum* Muhl. *villosum* Muhl. *Euphorbia repens. Euphorb. lutescens. Prunus pumila, nigra, pygmaea. Crataegus elliptica* Ph. Any plant which Pursh, Muhlenberg, etc. have not given as natives of the Northern States, would be highly acceptable, or indeed any new observations on old ones or habitats of uncommon species, etc. Do my dear Sir assist me to these, if you do not intend to use them in any publication of your own. Send me if you please, as soon as your health permits, a list of varieties in the classes between Decand. & Polyand. (including the former).

I have just received from Monticello, Georgia, a package of Cryptogamous plants among which are some quite new to me. Those specimens which will bear dividing I shall certainly share with you. The latter part of this week I will put a package into

the hands of the Easton Stage driver, & I hope you will receive it safely in a day or two after.

I remain my dear Sir, most sincerely
Your much obliged friend
JOHN TORREY—

THE REVD.
L. D. SCHWEINITZ
Bethlehem
Pennsylvania

TORREY TO SCHWEINITZ

NEW YORK, Feby 27th, 1824.

My Dear Sir

A few days since I wrote you a letter in which I promised to dispatch in a short time a package of plants for you. As usual, I have been several days after the time, but the little I have been able to get together is sent according to your direction, by the Easton stage. They are, indeed, trifles & I had a great mind not to send them—but you must take the will for the deed. The cryptogamia are numbered according to corresponding specimens which I have retained, as usual. I have, however, mislaid the memorandum of my last mission, & therefore I have begun with the number 600. Do, My Dear Sir, oblige me so much as to give me your opinion respecting these specimens, & also of those sent in a former package, some time since, of which there are some yet to hear from. There are a few specimens of cryptogamia, etc., from the West Indies, being duplicates of some lately presented me by *Dr. R. Madiana*—I wish you would oblige me with your determinations of these. More from the same quarter I shall have for you soon.

To make my little package more acceptable, I have added to it the 2nd. No. of my Flora [89] which goes partly through Pentandria Digynia. A third number is nearly finished, as you will see by the last proof-sheet but one, which I transmit as evidence. There will probably be about 7 Nos. in all, or about 1100 pages. I beg you will give me your candid remarks on this last No. which contains three or four typographical errors, independent of others, more important. But by all means let me profit by your observa-

tions & advice respecting that part of the work which yet remains to be printed. Descriptions or localities of new, rare or doubtful species will be most precious to me; and I may add, will make my book more valuable to others.

I will here make some observations on a number of plants which will soon come in order for publication. Please answer my queries as far as you are able.

1. *Arenaria canadensis* Pers. Is this more than a variety of *A. rubra* altered by its maritime situation? At any rate can it be distinct from *A. maritima* of Smith?
2. How shall I distinguish the caulescent species of *Oxalis*? Surely Elliott has made too many species. The characters of *O. stricta* & *corniculata* given in the books apply nearly as well to one as the other.
3. Is the *Cerastium glutinosum* of Nuttall the *C. longepedunculatum* (!!) of Muhlenberg?
4. Is *C. tenuifolium* of Pursh distinct from *C. arvense* of Europe?
5. Can *Lythrum verticillatum* be a congener with *L. hyssopifolium* & some Europ. specs.?
6. What is the *Euphorbia portulaccoides* of Muhlenberg's Catalogue [52]?
7. Is *Talinum teretifolium* as Mr. Rafinesque asserts, a peculiar genus?
8. What species of *Prunus* have you found in Pennsylvania? There are several mentioned by Pursh which I never saw. Indeed, I think he has made considerable confusion among many of the species. His *P. depressa* can scarcely be the straggling prostrate bush so common on Long Island & known by the name of *sand cherries*.
9. *Crataegus* also puzzles me. I want your list of northern species, with your synonyms. *C. elliptica* & *viridis* I am curious to see.
10. *Sorbus microcarpa*. Can you let me have a specimen of this?
11. *Pyrus ovalis*. Is this a good species?

Thus far I will go at this time, & as soon as I hear from you will furnish another list of such plants as I wish your opinion respecting.

It is well your package for Dr. Hooker did not come a few days sooner for the vessel by which I sent some things was wrecked be-

fore she reached Sandy Hook and I fear almost every thing lost. Should the gentleman who took charge of my packages & who was going directly to Dr. Hooker with them, take passage in another vessel, he will still be the best person to intrust with them. I have just received a letter from the Dr., in which he expresses the greatest desire to obtain specimens of North American plants. He is engaged in writing an Universal Flora,[*] in English; the first part of which will appear in April next. This work will be arranged according to the natural orders.

Our Lyceum flourishes more than ever, but still we labour under great disadvantages for want of funds. If we had such a man as Maclure to patronise us, the Academy of Philadelphia would not be before us many years. I send you a subscription paper for our Annals to circulate among such of your friends as you think would subscribe. We need some more subscribers to defray our expenses.

I mentioned some time since that Prof. Hooker had presented me with a copy of his Musci Exotici [35], a splendid work with numerous plates—Should you wish to loan this for a month or two, it is entirely at your service. I had commenced selecting some duplicates from the Nepal specimens sent me by the author, but I desisted, knowing he certainly would himself send good specimens of which I could only spare fragments—Still If you wish them, they shall most cheerfully be sent.

I send you a specimen of a Fern I once mentioned. It resembles *Woodsia* in some respects, but wants the capillary margin to the involucrum, & the capsules are not pedicellate. By the way, I have often examined specimens of *W. hyperborea* from Europe & never could observe the capsules & involucrum as represented by Brown in the Linnaean Transactions [14]. Our plant must be new, though it may have been included in *Aspidium obtusum* by Pursh & others. I also send you a *Woodsia* as it is called, which is probably *W. ilvensis*, though in this neither can I find the involûcrum, nor the pedicels of the capsules.

---

* [Hooker, Joseph Dalton. A sketch of the life and labours of Sir William Jackson Hooker. Ann. Bot. 16: XCIII (footnote). 1902.

"My father did contemplate such a work, but I am very sure that he never put pen or pencil to paper in prosecution of it."]

The copy of my Flora [89] I send you was damaged last night by the rain which penetrated my room. I have not another at hand, but you shall have a good one before long.

Yours truly

JOHN TORREY.

SCHWEINITZ TO TORREY

BETHLEHEM March 3d 1824

My dearest Sir

It is not surely to me that an apology is due for the interruption of our to me delightful correspondence for no less than two of your favors (of the 15th & 27th ult) are before me unanswered. They gave me the most lively pleasure I assure you—but so much the more I am grieved in being able to give you for the present so little satisfaction. Unexpected hindrances have ever since I completed my little *Carex* labors [71], such as I have taken the liberty to trouble you with—almost entirely prevented me from paying any attention to my botanical studies & still do so in a great measure. The first & worst was my indisposition, which but for an extraordinary exertion, threatened to immerse me in the most dreadful of all states, complete Hypochondria.—You can judge of what I was approaching when I inform you—that a resort to Botany, which had ever been a sure cure & relaxation to my mind—not only failed of its wonted efficacy—but that I even at times was upon the point of sacrificing it to the Demon that was assailing me, & felt something of that mental derangement which I presume is the precursor of suicide under other circumstances, prompting me to destroy my collections—or at least to dispose of them out of my sight. I thank God, that by the help of some good Doses I was enabled to conquer & am quite restored to my senses as well as to my health. But I had not yet fully recovered when a press of the most urgent business came upon me, which altho' it put me in a useful activity has utterly prevented me from taking up (except for a moment at a time) anything not in the absolute path of duty—nor am I yet entirely thro'—altho' I begin to perceive soundings.

Under such circumstances you will forgive if I am not yet able to satisfy all your requests. The package you announce in your last has not yet arrived—I shall however take measures immedi-

ately to find out whether it is at Easton or not. Permit me just to go thro' your two favors & to remark, what I am at present able to remark. Do by all means, make exactly such alterations in names & barbarities of any kind which I have committed as you think proper. I have a most shameful habit of putting down names for what I consider new, without sufficient reflection & afterwards forget to alter them. I am sure I wish you may have put something less indianic for my *Muskingumensis*—for if that should pass—who knows some future Botanist might think himself justified in calling a new *Carex* found by good luck near Chambersburg, Penns. (& I myself found one there that may possibly prove new) *Conecocheaguensis* to the utter dismay of all Europeans except the Russians, who might possibly punish us by even calling one *Tschernitiskowensis!!* Into "*granularioides*" meaning "like *granularis*" I suffered myself to be led by Prof. Dewey—it is certainly wrong. With the greatest pleasure I would furnish drawings of some of the species, you will kindly insert in the 3d [no. of the] Annals, if I could flatter myself with anything like leisure—as it is Mr. Halsey will do me the greatest favor to attend to them. I rely implicitly on his accuracy & skill. I am delighted with the prospect of soon getting your published 2 Number of the Flora [89]—I hope however you consider me as a subscriber—as well as to the Annals—of which I very much long to see the number cont[ainin]g the rest of my table [67].. The correspondence of Mr. Cooper will be highly acceptable to me—& nothing more important could he do than to attack Syngenesia—if he does resolve, the loan & use of my collection shall be at his service.

I am greatly obliged to you for your remarks on the few grasses I sent. Is the *Poa*—n. 2. I sent—the one with black scales?—that surely is no var. of *nervata*. I have since been convinced that my *F. diandra* is the *nutans*. 5 *Cyp*[*erus*] *virens?*—I never saw the *parviflorus*, & cannot therefore know whether it be that.—You are certainly correct in believing my *Dulich*[*ium*] *canadense* the same with *D. spathaceum*. It is a variety however somewhat constant.

The history I have given of *C. hystericina's* name is correct —but it is very probable that it is nothing but *C. Pseudocyper*[*us*] —of Am.—not however the *Pseudocyp.* of Germany.—13. I

confess I begin to doubt a little about my *Carex costata* altho it is very constant—if a mere variety. I hardly think you would conceive the *Muskingumensis* so very near *lagopod.* if you had seen it grow. 16. The greater part of my *straminea* had 3 spikes.

Among the plants you desire specially I am sorry to say that *Hydrangea vulgaris* (common here) is the only one which I can furnish. Of *Sedum telephioides*—common on the mount. of Carol.—I have but one specimen—it is very near [*S.*]. *Teleph*[*ium*]. *Cerastium hirsutum* Muhl. I think is certainly only *C. vulgat.* If possible I will [add] to this letter a list of our rarer plants here—so that you can point out such as you would choose. It would be extremely acceptable to me to get some of the interesting Georgia Cryptogamists you allude to.

As regards the queries in your last I am conscious of not being able to give you much satisfaction—as they chiefly regard matters that I have only superficially attended to—

The *Arenaria canadensis*—I have only seen in one specimen from you. The caulescent *Oxalis*—puzzle me as much as you—besides the *stricta* & *corniculata*—the one with large broad, the other with small leaves & certainly very similar—I however have found one other frequently in Carol[ina] (not here) which I think very different (among the rest the folia are invariably tinged velvet purple) but I have not been able to reduce it to any of Elliott's.—The *Cerast. longepedunculat.* of Muhl.—by specimens from himself is most undoubtedly the *glutinosum* of Nuttall—concerning the *tenuifol.* of Pursh I have little doubt that it is the same with European—& American *arvense* the latter perfectly the same with *arvense* E.—covers certain rocks on Delaware near Easton. I have doubts myself whether the *Lythr*[*um*] *verticillat.*—& *L. hyssopifol*[*ium*] are congeners (confessing however that I have rarely studied the generic differences of my plant)—but I think it certainly is of the *Lythrum Salicaria* of Europe. Among my Plants of the Pine barrens N. C. I have one I call *Euph. portulacoid.*—but I am not competent to say it is the Muhlenbergian—mine is a distinct plant.

The *Talinum teretifol*[*ium*]—very common on rocks in Carol.—is so distinct a plant that I never once recurred to the generic examination.—As to the genus *Prunus* & [the genus] *Cra-*

taegus—I have hitherto contented myself with collecting as many forms as I could get—but have never attempted a comparison of synonyms—I find few *Crataegi* here—at Salem they were very numerous. These two genera I was in great hopes of bringing into order by your means. *Sorbus microcarpa* I am quite unacquainted with—& tho' I think they are two species—the northern & southern *Pyrus Botryap[ium]*—I do not know which is that & which *ovalis*—I rather however think our northern one is "*Botryap[ium]*."

I shall exert myself to procure subscribers to the Annals & should have done so before this, if I had been acquainted with the terms.

Have you ever seen that most remarkable *Neottia* which Solomon Conrad found last year—the flower very much like *tortilis*.—but with four leaves at base thus [figure inserted].

I wish Mr.Halsey would let me hear from him again—I find I must refer you to the margin of the manuscript I sent him for Bethl. plants. I have no means left to make out a list, until I get that back—But even that is deficient & does not contain the Bethl. plants further than Syngen[esia].

Hoping I shall soon receive your promised Packet

I remain Yours affectionately

LEWIS D V SCHWEINITZ

SCHWEINITZ TO TORREY

BETHL. March. 28th 1824

My dear Sir

Since I had the great pleasure to receive your last favor of Febr. 27th which I answered immediately I have at length likewise received the valuable package you sent me—the contents of which were most acceptable indeed. I had begun to make some observations on the 2d number of your excellent work—which however have been quite curtailed by a press of duties.—You will forgive me for sending them[*] to you in their present crude state—conceiving some of them may however occasion you to point out what you would like to know more particularly. I have been delighted by your reported progress & begin to look forward

* [Printed following this letter.]

eagerly for the next number. A few days ago I received the 3d N- of the Annals—& am sorry to see that you have not corrected all my barbarities. If we had had time to discuss the matter I should have preferred not to have the *Carex* table [**67**] printed in the tabular form, which renders it necessary to put it in lengthways & renders its use somewhat inconvenient. But in the main it will do well enough.

As regards the rest of the contents of the package I was much delighted & instructed by them—especially the American plants & those from Guadeloupe. I hope soon to be able to inform you of what I think the undetermined specimens are. As to the mosses from Georgia I think with few exceptions they are not distinct ones. My time is so much occupied just now, that I have not had leisure to submit them to any critical examination. I wish you had put up for me some of the Nepaul specimens from Dr. Hooker—God knows when I shall ever receive anything from him—But do not deprive yourself. The fern you sent me—as a *Woodsia* is undoubtedly the *Aspid. obtusum* of others—my specimens from Muhl. agree exactly—but I believe it is a *Woodsia*. Mr. Conrad of Philad. gave me specimens under the same conviction.

It was unlucky that the moisture from the wet cover of the number of your Flora [**86**] (which is only damaged in the blue cover & conseq. of no account) occasioned on the long journey of the package, that all the mosses & some of the West Indian plants were covered by mucor in such a manner as seriously to injure some of them.

What can the matter be with our friend Mr. Halsey? Since I sent him my Lichens I have had no letter from him, & fear he is unwell.

I was much pleased with Mr. LeConte's paper on the *Utriculariae* [**43**].—It is a matter of the utmost consequence to elucidate single genera in that way & nothing I think could tend more to render the Annals as well as the Phil. Journal [**60**]— important & useful, altho its size admits only of such reviews of the smaller Genera.

Accept dear Sir—the assurance of sincere respect & friend[ship]

from Yours affectionately

LEWIS D V SCHWEINITZ

Heuchera pubescens. I think the species you describe is past all doubt the *H. caulescens* of Pursh—a most elegant plant with very large flowers & leaves on the stalk. I hope to be able to send you a specimen. It is very common in the Allegany mts.—I found it likewise but much smaller at Harrisb[urg].

I. Plants in Dr. Torrey's Flora highly desirable [lists 31; 13 from no. 1, 18 from no. 2].

II. Remarks on No. 2 of Dr. Torrey's Flora.

1. *Digitaria serotina.* This species is marked +. Why? It grows not rarely here at Bethlehem and is very distinct from any of the others.
2. *Andropogon virginicum.* Are you confident that this is the same with the *A. dissitiflorum* Elliott?—I have two species, one of which I call *A. virg.*—the other *dissitif.* both from Carolina.
3. *Androp. nutans.* The species which grows here plentifully—and which agrees well with *avenaceum*, is I think considerably different from the one I called *nutans* at Salem—perhaps a variety only. The Bethl[ehem] species differs at first sight, by the dark brown color of the seeds—which in Carol. is always quite light.
4. *Proserpinaca pectinacea.* There is not the slightest doubt in in my mind that this species is perfectly distinct from the former [*P. palustris*].
5. *Galium tinctorium.* I believe with you that what we call *tinctorium* here is not distinct from *trifidum.* But the true *tinctorium* of the Musking[um] from which the Indians—according to all our missionaries—make their red dye—is different.
6. *G. boreale;* not rare at Hope, New Jersey, and Easton. What I have by the name of *bermud[ianum]* appears to belong to this.
7. *Sanguisorba media.* I have found a species, exactly answering this, which appears distinct enough—much smaller than *canadens[is]* in all its parts.
8. *Plantago media.*—My specimen from this vicinity is exactly like the *P. media* and quite distinct from *major.*
9. Have you seen the *Exacum?*—Pursh or Nuttall doubts its existence.

10. *Potamogeton fluitans* of Europe is extremely different from *natans*—but I have never met with it in Am.

11. *Potamogeton pauciflorum;* this is common here—but it is surely not the *P. gramineum* of Germany, which again is a most common brook species in Carolina, agreeing perfectly with the German one.

Lithosperm[um] latifolium of Mx. is a plant perfectly distinct from *L. officinale*—and common in the western woods—Bartram's I presume is not the true one.

Lysimachia hybrida as I have it in Salem—is surely distinct from *L. ciliata.*—Why do you consider that and *heterophylla* (of which I am ignorant) the same? The name seems to require quite a different plant.

Verbascum Blattaria. I am very sorry that I possess but one specimen—found by myself in Surrey County, N. C.—of *V. Claytoni.* It is as distinct and beautiful a species as can be imagined.

Ipomaea purpurea and *Nil;* tho these are probably not indigenous here—there can be no doubt of their being so southwardly.

Convolvulus spithameus and *tomentosus* [the name *Convolvulus tomentosus* does not appear in Torrey's work, but *Calystegia tomentosa* is given as a synonym of *Convolvulus spithameus*]. I fancy there must be a great confusion as regards this and the next. *Spithameus*, common in Carol., I have not observed here, and there it is never trailing nor pubescent—and *C. tomentosa* is absolutely tomentosely velvety and trailing (I therefore doubt whether it is *stans*).—It was found by me on the tops of the Allegany mount[ains] in quantities.

Impatiens. I am astonished to read your remark concerning the similarity of *pallida* and *fulva*—for what I distinguish as each—are altogether different.—Both grow here.—The flower of *pallida* is double the size of *fulva.*

Ceanothus. The common species in Carolina is utterly devoid of pubescence except on the ribs—but it is not altogether herbaceous—the stems do not die more than half down.

Campanula americana and *acuminata*—as distinguished by me—the former only in Carolina—the latter here and Ohio—are certainly two very good species—The leaves of the latter are very thick, those of the first remarkably thin.

Viola clandestina. I have found past flowering in great quantities about the coal mine, Lehigh—but I confess that since I have studied the *V. blanda* in nature here at Bethl[ehem] I begin to believe that they are not distinct, especially since I have had an opportunity to recur to my deceased friend Steinhauer's drawing and find I am mistaken as to his having represented the chocolate-colored petals. I think it is a very happy thought of yours to refer the expression of Pursh to the fruit.

V. erioearpa Swz. Since I am in the habit of finding *V. pubescens* with and without woolly capsules here (it was not met with at Salem), I am more determined in my opinion that my *eriocarpa* is a different species.

Asclepias nivea—found by me in the Alleghany mts.—is the only species which I have from the northern states not in your Flora, in the present number.

TORREY TO SCHWEINITZ

NEW YORK, May 20th 1824.

My dear Sir,

Surely I am the most unfortunate man in the world when I have for years anxiously desired to behold your face & yet was a few weeks since within a few yards of you or perhaps even passed you without my knowledge. On this day last month I became a benedict & on the 27th I was in Philadelphia with my wife, where we remained four days. It was with the deepest regret & mortification that I learned from Mr. Collins, the evening before our departure, that you had been in Philadelphia nearly all the time that we were there, & that you had only left town but a few hours before. What a disappointment! I don't know a person I am more anxious to see than yourself & to find I have lost an opportunity of gratifying myself which may be the last for a long time yet, made me quite melancholy. You will now be prepared, I trust, to make abundant allowances for the manner in which I have treated you for some time past; for some preparation, you know, is necessary, before one can make so great a change in his situation. There are now before me two of your letters, the latest of which I received at least six weeks ago. I am now clearing off a mass of business which has accumulated on me during the

honey-moon & some time previous. You are one of the first of my correspondents whom I attend to, for to none am I under more, if so many, obligations as yourself. I am delighted to hear that you did not become a victim to the "*Demon*" which assailed you the last winter. May you continue to enjoy uninterrupted good health, & have inclination & leisure to prosecute those studies which are so dear to us both!

I told you that the synoptical table of Carices [67] was partly *worked off* when I received some of your & Dewey's alterations & that they arrived too late. The paper looks very well however. In our next no. (the 5th) we propose to commence the detailed descriptions of new & rare species from your monography [71]. It is uncertain whether we shall give a plate of them in that number but we shall do so in the 6 no. if possible. Should you have any corrections to make they will be quite in season if sent in the course of two or three weeks. We will send you, shortly, a list of those of which we wish drawings made. Several species may be drawn on one plate after the manner of Schkuhr.

You ask me if I have seen a species of *Neottia*, resembling *N. tortilis* but with radical leaves. The common *tortilis*, as it occurs here, very often has one or more ovate radical leaves, which are frequently reticulated, as in *N. pubescens*, though smooth, and much smaller. I have received specimens of it in this state from many parts of the northern States, & from the western parts of New York. It does not appear to be a new species. The *N. cernua* I know to be a very variable species: sometimes occurring only 2–3 inches high, with lanceolate leaves, & at other times acquiring a height of nearly 3 feet with very numerous flowers.

I regret to learn that my last package was in such a damaged state when it reached you. The copy of my Flora [89] shall be replaced by another one. For your criticisms on the 2nd no. I render you my warmest thanks; hoping, however, that you will, when more at leisure, extend your remarks & expose all the errors you can detect. The *Digitaria serotina* of your neighbourhood, I should be much pleased to see. Do let me have specimens of it. Also of your *Sanguisorba media*! It really pleases me to find that you agree to my opinion respecting the *Viola clandestina*. It surely must be *blanda*.

I mentioned to my friend Halsey some time since that you were desirous of hearing from him & I presume he has by this time written to you. The Salem Catalogue etc. are quite safe & will be returned shortly. Mr. H. has but little time to devote to science, but he is very industrious & a good economist of what leisure he has.

We are quite active in our Lyceum, having now some good working members. Cooper, DeKay & Van Rensselaer set out the other day on an expedition to New Jersey for plants & organic remains. We expect much from their science and zeal.

My Flora [89] is at a stand for a little while. The 1st vol. which closed with Icosandria is finished, & the part that is due to you shall be sent soon. Please get ready your rarities etc. for the 2nd vol.[*]

I hope soon to have ready a small package for you,—principally of foreign Cryptogamia. There will be among them some of the Nepal musci etc.

The inclosed letter I received in a package from Professor Hooker. The seal was broken by me, through mistake. I discovered my error after reading one or two lines & immediately desisted. Pray don't for the world think I did it intentionally.

Since I wrote you last I have received many interesting plants, but no new books. There is something doing in Europe in Botany. Hooker you know is engaged in writing an Universal Flora in English.[†] De Candolle in a Synopsis plantarum [16], etc. In the first vol. of the Lin. Trans. of Paris is a long paper on mosses by Beauvois [57], with some excellent plates. It is very much like his *Prodrom*[*e*] [58], which he published in 1805.—

I remain, Dear Sir

Yours most cordially

JOHN TORREY.

P.S.—June 1st. This letter I have just found where it was accidentally laid some days ago. It was my impression that I sent it to the postoffice. Do pardon my neglect.

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* [Never published.]

† [See footnote, p. 205.]

SCHWEINITZ TO TORREY

BETHL. July 6th 1824

My dear Sir

It will occasionally happen that even a correspondence so agreeable & interesting in its nature as the one I am happy enough to enjoy with you, becomes subject to interruptions. The only remedy is to resume as soon as possible. Yours of the 20th May reached me some time in the middle of June & gave me the utmost pleasure—as a resumption of the kind on your part which I instantly felt the imperious duty of reciprocating, more especially as I have none of those excuses to make, which you urge upon me with irresistible force, for when a Lady's in the case—of course all other things give place—but alas! see how I have again neglected, what in itself gives me such pleasure. Nevertheless I hope it is not too late to express my sincere congratulations upon your conversion from celibacy, in which besides my very unfeigned share in your happiness, I am not without interested motives. For I hold it a matter of course that every Lady, above all a married one, must necessarily become a promoter of the worship of Flora preferably to that of the author of Dust and Dirt, that enemy of all neatness and cleanliness in the house whom mineralogists delight to honor. My disappointment & vexation was at least equal to yours, when I found by your kind letter how near you were to me at Philadelphia, but it is surpassed by my anger at Mr. Collins who might have told me, as I had a long conversation with him about my desire of seeing you, which had almost prompted me to return home by way of New York at that time. I am now glad I did not, for that would have been worse still had I missed you there. I am not without hopes, provided the yellow fever keeps out of the way to be able to effect a visit some time in the fall. Your kind interest in my health gave me sincere satisfaction. I thank God I have nothing to complain of & would have been active this year to a much greater degree than has been the case in Botany if my official duties had not been unusually pressing. I however contrived a short journey thro' the mountains between this and the Susquehannah in May, which has not been quite unproductive.

I should have been glad to receive the list of *Carices* you want me to give drawings of before this—for it will now be too

late, as within a fortnight I shall have for a week or two to make an absolute pause in my botanical pursuits on account of business—I have very carefully revised the *Carices* this season—but have no other correction to make of consequence, except requesting you by all means to strike out the whole of the description of my supposed new Species *Carex typhinoides*—for I have found it in great plenty this year growing in such a manner as to leave no doubt that it is only a variety of *C. squarrosa*. All the rest of my species I have found confirmed, & met with a number of new ones, besides finding a number here & in the mountains, which I had before only met with in North Carolina. I am obliged to you for your answer concerning the *Neottia*, & shall attend to collecting for you *Digit[aria] serotina*. I have now observed the *V[iola] clandestina* in plenty in the Beech woods (by the bye I only past thro' a small corner of them, & conceive they must be very fertile in interesting plants more especially Musci &c.) & am quite certain it is only a variety of *blanda*.

You must have mistaken my remark concerning your 2d Vol of the Flora [**86**]—that is not at all damaged—but I am extremely desirous of seeing the 3d number. If you could immediatley on receiving this hand it to my friend Rev. Benj. Mortimer, Fulton Street (& doubly should I rejoice if you could add the small package of Cryptog. of which you speak—trebly if there were some American phaenogamous additions from the North, South, East, or West) I should probably receive it soon as he is comming here in the course of the week ending the 25th. When he returns I hope to forward to you a considerable packet cont'g near 1000 Phaenog. & Cryp. for Prof. Hooker—for alas I believe I have nothing more to send to yourself. Be assured that I shall always desire you to read any communication Prof. Hooker may make to me— so there is no need of excusing your opening his letter.

I wish I could say as you do—that since my last I have received a good number of new Plants—I did expect many—but I have got a very few only—& begin to think my Den the very contrary of the Lion's, for there are a great many more footsteps going out than in. This, however, I beg you not to apply to yourself—for there is a good path trod by your "In trades." The matter is that it is not altogether easy to get more after one has got a certain quantity.

No news of Mr. Nuttall's return yet! It is rather a dangerous experiment to get a large fortune as I hear he has—it is even more so than Mineralogy.

You will greatly oblige me my dear Sir to let me hear from you if possible by Mr. Mortimer. Be so good as to present my best respects to Mr. Halsey in whose debt I am I believe.

I remain yours most cordially

LEWIS D v SCHWEINITZ

P.S. My dear sir, now that you have so very properly followed Benedict's example, I beg leave to inform you, that it is almost an indispensable piece of fashion to make the tour of Easton, Bethlehem (& Mauch Chunk if you please) for a newly married gentleman & his lady & will not doubt your willingness to follow the good fashion at least as far as Bethlehem, where I hope to give you cogent reasons for stay. That unfortunate namesake of yours, of whom I have heretofore told you, keeps pestering me with disappointments—as yesterday calling upon me—in order to convince me of the probability that some species of grasses—white clover for instance & sorrel—according to his classification of grasses—occasionally spring up without seed or root from mere chemical composition of their component parts, of which it appears he considers marle a principal one.

SCHWEINITZ TO TORREY

BETHLEHEM Sept. 13th 1824

Dear Sir

I have succeeded in persuading myself that the circumstance of my not receiving an answer to my long lost letter of a forgotten date was owing to some absence of yours from home. I sincerely hope that my not receiving advice from you of the safe arrival of a very large Packet for Dr. Hooker at Glasgow which I forwarded to you by my friend Rev. Benj. Mortimer of New York is owing to the same circumstance as I should be very sorry indeed to learn that anything untoward should have happened to that package.

The object of my present letter, under the hypothesis that you may now probably have returned from the supposed Journey is to beg leave to introduce to your acquaintance my highly re-

spected Friend, Bishop Hüffel of our Church whom you will find among other estimable qualities imbued with the most lively interest & profound knowledge of almost every part of the Natural Sciences, especially Mineralogy & Botany. I am sure it will give you pleasure to see him & he very warmly desires to become acquainted with you.

As I really burn with impatience to see your third number of the Flora [89]—I beg earnestly you may be so good as to send it hither by Bishop Hüffel, who will return towards the end of the month—& if you can add anything in my line from your collections you will highly oblige me. As I have not a moment to spare (4 weeks sickness has greatly augmented my business & deprived me of the time I desired to devote to Botany) I only add that I am as ever

Yours most sincerely
LEWIS D V SCHWEINITZ

TORREY TO SCHWEINITZ

WEST POINT November 11th 1824

My dear Sir,

Two esteemed letters of yours have long been reproaching me with neglecting one of my best friends. The first I received so long ago as the 6th July last, & the 2nd the 13th September! Yet I can hardly say they could well have been answered before. You have heard, doubtless, of my being appointed Prof^r. of Chemistry & Mineralogy in this place. I have been here nearly 3 months & my labours during that time have been incessant. I had been for a long time a candidate for the situation here—but after Dr. Percival (my predecessor) was appointed, I gave up all hopes of obtaining it. At length, however, this gentleman resigned, & I was chosen in his p'ace. As this was unexpected to me & as I was somewhat rusty in Chemistry—& had not a line written for lectures either on this subject or on mineralogy, you may suppose I have had few leisure moments until this time. For until lately I had to deliver 2 distinct courses of lectures, & to write a lecture a day. At last, I have more time; my assistant having returned to duty. My situation here is very pleasant,—almost the only thing I regret about it is that I have so little leisure to devote to

botany.—There is, however, a vacation of 2 months in the year (July & August) which I can spend as I please.—During our reviews also two more months are spent without my lecturing—wh[ich] relieves me from that wh. consumes the most of my time—viz. the writing of lectures.—Besides—after this year, if God spare my life, I shall have a complete course entirely written out. You see I am still devoted to our favorite science—I hope *never* to give it up—

Really it is time you received something more from me than promises—for these have been reiterated by me for the twentieth time & nothing has been sent to you yet.—Having at last settled myself & having a beloved partner who takes a strong interest in my favorite pursuits, I hope with her help to arrange & place in complete order my little collections & thus to know certainly what I possess.—Then it will be in my power to be more useful to my friends—& also to furnish them with my precise desiderata. You must not be out of patience with me for I do as well as I can. You are yourself to blame, for by your liberality bringing me so much in your debt.

In your 2nd letter you hope that the cause of my long silence was my absence from the city.—As you now know how I have been occupied for some time past I trust you have already pardoned my neglect. But there is another fault I have been guilty of wh[ich] I fear will not so readily be overlooked by you. One of the two bundles of plants which you sent me for Prof[r]. Hooker (that brought by Mr. Mortimer) was only forwarded about a month since! My apology must be frequent absence from the city and almost continual hurry & business. It has, I hope—ere this reached him in safety. The other package I delivered into Mr. Halsey's hands to transmit—as he was in the mercantile way & could watch the opportunities for Glasgow. Did you receive a letter from the Prof[r]. a few days since? He also sent me a package for you—after looking at the contents (wh[ich] I knew to be Greville's Cryptog.) [28] I sent it [in *] care of Mr. Mortimer in N. Y. with a request that [it should] be sent you by the first opportunity. [I have] litt e news to tell you—Hooker has

* [Note: The paper is torn at this point and several words are omitted in this and the following line.

just sent me the 1st vol. of DeCandolle's Prodromus [16]—a wonderful work! Greville his Flora Edinensis [27] etc.

Halsey is working hard at the Lichens, Cooper at fruits, & the rest of the members of our Lyceum at their several favourite departments. Elliott's 6th No. [22] is received but he says a 7th no. will be necessary to complete the 2nd Vol. I shall immediately dispatch my 3rd No. [89] to Mr. Mortimer for you. I long to finish the work.—Do you still intend to join Halsey & myself in writing a cryptogamic Flora of N. America? Perhaps I may not have time for this year to do much—but I am steady to my purpose—

How I regret missing Bishop Hüffel! Indeed it was a great loss to me.

I remain your sincere friend

JOHN TORREY

SCHWEINITZ TO TORREY

BETHLEHEM Dec 5th 1824

My dear Sir

Really your favor of [the] 11th ult. came in good time to save me from sincere concern on account of the loss I began to apprehend that I & your friends had suffered by your absolutely vanishing out of all record. It has given me proportionate joy to find, that you have only vanished to rise in glory at West Point & I the more sincerely congratulate you upon that situation since I learn by your kind letter that there are hopes that your new duties will not deprive Botany altogether of your important services—nay that there is a prospect that your benedictism will be the means of aiding you in your good botanical intentions toward me.—If you will however take the advice of an experienced man of matrimony, you will do well to do, what you mean to do together in that line as soon as possible, for fear of interruptions incidental to your new situation after a certain number of moons.

I have neither received the letter you allude to from Professor Hooker, nor the package you kindly forwarded to Mr. Mortimer—nor your third number of the Flora [89] all which I am most sincerely desirous to receive. There is one thing which I regret very much, that by your removal from New York it will be possible that I shall lose the pleasure of seeing you on my journey to that

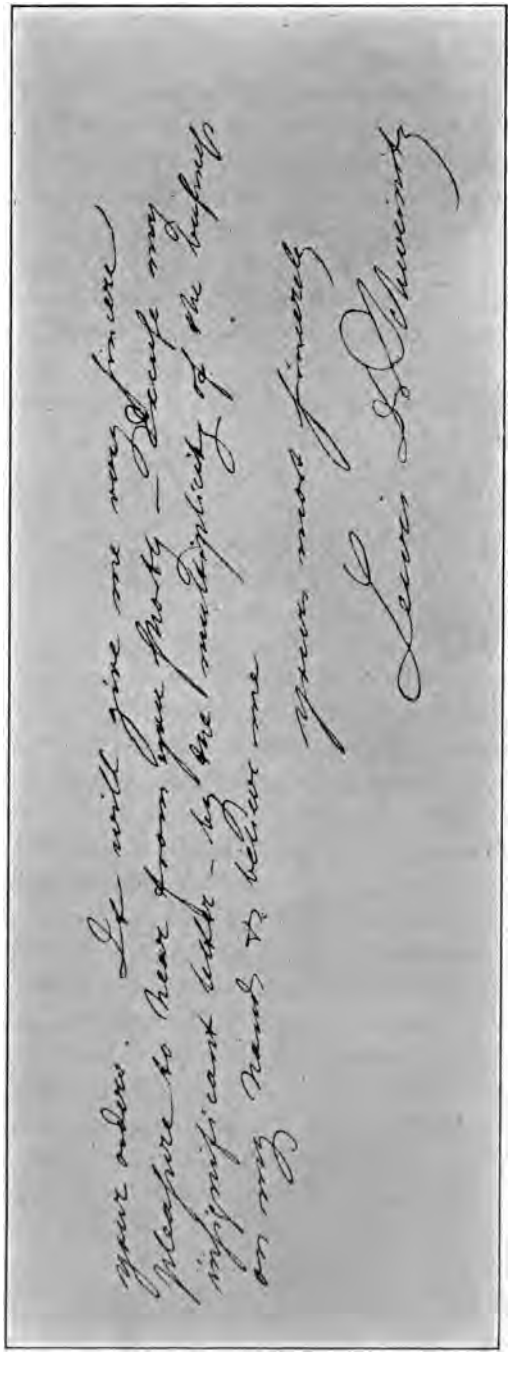

FIG. 3. Portion of letter of Schweinitz to Torrey, page 222.

place in spring. I shall at farthest by the 1st April have to embark there for Europe, hoping to return before the close of the year. This circumstance will cause me to lose one whole year in my botanical studies, but will I hope enable me to augment my means considerably altho' my journey being of an official kind will not leave me much time for scientific purposes. If I however can be of any service to you with your friends in Germany (my stay in Engld & France will be very short) I shall be at your orders. It will give me very sincere pleasure to hear from you shortly—Excuse my insignificant letter—by the multiplicity of the business on my hands & believe me

Yours most sincerely

LEWIS D V SCHWEINITZ

TORREY TO SCHWEINITZ

WEST POINT, Jan^{y} 7th, 1825.

My dear Sir,

Your letter of the 5 ult. came safely to hand after being a full week on the road. I hope you have by this time received the letter from Professor Hooker, together withthe package of books from the same gentleman. A few weeks since a friend received for me at the Custom House in New York, a package from Mr. (now Dr.) Greville, which inclosed one for you. The latter I directed to be left at the house of Mr. Mortimer, & I expect it has before this time been safely received. Also the 3rd No. of my Flora [89], which I sent you long since.

The pleasure I hope to receive by a visit from you in the spring, will be mingled with regret that I shall immediately after be deprived for a season of your most delightful correspondence. Do, my dear Sir, make your stay in Europe as short as possible.—But above all, leave not our country without letting me see your face. If it is not convenient for you to visit West Point, I shall certainly see you in New York. Perhaps you will lose little in Botany by your absence from America, for you will enjoy very great opportunities to collect specimens of plants abroad. You must remember your friends & never neglect an opportunity of collecting a duplicate for me! Probably I shall trouble you with a commision or two—particularly with a package for the illustrious De Candolle—for you surely cannot think of visiting Europe without making a journey to Geneva.

My principal object in writing to you at this time, is to beg you will give the Lyceum your last determinations of the *Carices*. We have completed the 1st part of the 1st vol. of our Annals, & intend taking up the greater part of the two or three next Numbers with your *Historia* [71]. You know that several new species have been discovered by Dewey, & that in the last number of Silliman's Journal the gentleman has written largely on them [19]. In the number now due, he will have another long paper.—All these will, I suppose, make a few alterations necessary in your Mss. Besides we beg you will make a list of those species which you think should be figured. Several species may be put upon a single plate,

& thus, perhaps, all the new or rare ones be represented upon six or seven plates. If you could have a few drawn at Bethlehem, upon an 8vo-size, Mr. Halsey will endeavour to do some of the rest—but he has too little leisure to draw the whole. One of Dewey's n. sp. in the last no. of Sill. [19] is the one we have called *C. longirostris*—I forget his name, but you will easily recognize it. You will oblige the Society by writing either to Dr. DeKay or to Mr. Halsey on the subject, for they wish to commence the printing immediately. You may send a few corrections of the Mss. (if any are necessary) at once.

I have just looked over the narrative [41] of Maj. Long's second expedition.—It is tolerable—though there is quite too much of it. But they determined, before they set out, to write two volumes! This *I know*—for I was to have accompanied the expedition.

You have made the most of the lean herbarium they collected. Indeed I think the appendix [69] is the most valuable part of the book—Are there any duplicates of the new species?

I am in great want of the following plants.

Potentilla hirsuta
—— supina
Ascyrum stans
Caltha parnassifolia
—— dentata
—— flabellifolia
Scutellaria incana *Muhl.*
Zapania lanceolata
Scrophularia hirsuta *Muhl.*
?Herpestis cuneifolia
Draba arabisans
Dentaria heterophylla
—— maxima
Polygala fastigiata *Nutt.*
—— brevifol[ia]
Glycine umbellata
Aeschynomene hispida
Hedysarum laevigatum *Nutt.*
Astragalus carolinianus
Lactuca hirsuta *Muhl.*
Mikania pubescens
Kuhnia eupatorioides
—— Critonia
Cineraria heterophylla
Orchis integra *Nutt.*

Any of these which you can furnish me with would be highly acceptable. I intend soon, however, to make out a complete list of my desiderata & shall furnish you with a copy of it. I am particularly deficient in Southern Syngenesia.

At this moment I am very much engaged with our semi-

annual examination.—It lasts the whole of this month.—Every day, from 7 A. M. till 5 P. M. except one hour for dinner.

In great haste,

Your sincere friend

JOHN TORREY

SCHWEINITZ TO TORREY

BETHLEHEM January 16th 1825

My dear Sir

Your obliging favor of the 7th instant came safely to hand & caused me the most lively pleasure as I had begun to despair whether mine had reached you or to doubt whether my old Carolina friend Macon's [*] pennyworth of savings policy displayed contra West Point might not have the effect of bringing me into disgrace with you under a suspicion of being one of the conspiracy. I assure you, however, I am not of their council, altho' I very seriously object to the furious method of a semiannual consumption of a whole month in examinations, which deprive you of all scientific leisure unles these examinations be followed as I hope they are by an adequate resting time of another month.

With great pleasure I acknowledge the receipt of the two packages from Hooker & Greville & of the 3rd No of your Flora [89] per Mr. Mortimer, on the last day of the year. I have made a shift cursorily to study thro' the latter & am highly pleased with it. A few species only that I possess from the regions you embrace are omitted & a number of very judicious reductions have taken place. My time forbids my entering into remarks at length, which would require a longer study than I am, standing on the wing as I do, able to devote to it just now.

I assure you that the hope you hold out that I shall have the pleasure of seeing you at New York before I leave America goes a great way in reconciling me to the deplorable hurry in which I am under the necessity of making my intended Journey outward bound. I have just given an outline of the circumstances which embarrass me to our friend Mr. Halsey (to whom I have written according to your direction) but you being an old and experienced

* [Macon, Nathaniel, U. S. Senator from North Carolina 1815–1828. Consistently voted against all internal improvements.]

husband by this time will be better able to appreciate them. The purpose (viz. that which my duty imposes) of my whole journey, makes it indispensable that I should be at Herrnhut in Upper Lusatia, Saxony, by the 30th day of May next, while certain events, in themselves highly desirable, but most unfortunately ill timed, to be expected in my family will forbid my leaving home earlier than to allow me to arrive at New York 2 or three days before the 1st April on which day it is evidently necessary for me to embark if I wish to have any reasonable hope left of reaching my place of destination in time. You see, my dear Sir, that under such circumstances all my hopes of having the pleasure of seeing you, which next to the safe arrival of a little girl in my house, I most ardently desire of all things, will depend on the possibility of your calling for me at Mr. Mortimer's on one of the two or three days before the 1st of April—if I succeed in this hope, I shall take it as an *omen faustissimum* that I shall be further able to propitiate the Sea & Wind Gods & the tremendous host of Infernals usually styled Postmasters in Germany in such a manner as to complete my Journey in time to have an odd week for seeing more of Paris (where I have never been) than can be seen thro' the coach windows of a Diligence.

You will, however, be able to judge from the above how little time I can in the best event devote, outward bound, to science &c.— & that Linneaus, Descandolles, Persoon, & all the semi & demigods of Botany holding council ten miles out of my direct route, could hardly justify a deviation of that length. Nevertheless, if I can take charge of anything for you, which does not absolutely require personal delivery, it will give me the most sensible pleasure.

I have proposed to Mr. Halsey—as I have not a moment's time now to devote to Botany (I don't know whether you are aware that notwithstanding my want of abilities & qualifications I am clothed with some 15 or 20 different official capacities, all of which require some management when about to be suspended for 9 months) tho' without much hope that it will be of material use as regards the proposed publication of my *Carices* [71], on account of the lateness of the Idea, to bring with me to New York my whole collection of *Carices* European & American for his and your use during my absence. It would at least enable you to become ocularly acquainted

with the whole—& I would have no objection to your keeping anything you like, where your own discretion would shew that enough was left me—altho' I should like it best, if you would in that case adopt the Jewish maxim of tooth for tooth & *Carex* for *Carex*. Let me know, my dear Sir, whether my proposal would meet your approbation.

Concerning your purpose of a Joint Crypt. Flora, I assure you I am ready, or shall be after my return, instantly to commence operations, & one main reason why I wish to see you personally is to chalk out some feasable plan. The Fungi are the only department I feel anything like competency for. But don't forget that my Sum of American ones is already 2000 spec. (more than one half of the whole I don't believe this to be) & that it will be necessary to develope to the American public the absolutely miraculous concatenation of progressions which they display. To judge by the effect which my own insight into this wonderful system of nature has had upon me, my only fear is, that when once displayed before the eyes of the American people, its attractions & fascinations will prove so great, as to become detrimental to the commercial prosperity of your Monster of a city, by turning the attention of all from the Canals & Banks toward the Fungi. I entirely agree with you—as regards Long's se[con]d Journey, except in the value you by way of compliment, see proper to give my attempt [69] to skim some little fat from a truly lean Herbarium. There is almost as much garrulity in the book [41], as in this letter & not much more matter. However, what could be expected from so furious a ride thro' the woods, & Mr. Say certainly deserves praise for the pains he took to save what could be picked up on a gallop. It grieves me very much that I have not one duplicate to spare of the whole list you mention. But if it is only your wish to see specimens & examine, I will select such as I have from my Herbar. & bring them with me leaving them in your hands on Interest till my return. Inform me whether this will answer.

I am with sincere affect.

Yours

L D v SCHWEINITZ

TORREY TO SCHWEINITZ

WEST POINT, March 17th 1825

My dear Sir

It is nearly two months since I received your last kind letter, in which you give the unpleasant intelligence that an interruption will probably soon take place in our correspondence, to continue perhaps for a *whole year*! This has made me feel quite sad—for you are my main dependence in Botany—besides being a friend for whom (though I have never had the good fortune to see you face to face), I have formed a sincere attachment. But enough of this painful subject—I have hardly enjoyed a leisure moment to answer your letter before—and now perhaps I may be too late—This I send to inform you, of my intention to be in New York, (D. V.) on Saturday morning week if I do not hear from you in the interim. I shall call immediately at Mr. Mortimer's where you doubtless will stay in the city. Hoping to see you then, and have a *long talk* about matters and things in general, I shall make this epistle brief. I cannot help telling you, however, that a young lady was added to our family last week—and that both mother and child appear to be doing well.—It appears, by your letter, that a like event is about, or has already, taken place in *your* family—I hope you may be as fortunate as we have been. You must be too much hurried to read any more—So good bye till we meet— Your sincere friend

JOHN TORREY

TORREY TO SCHWEINITZ

WEST POINT, March 30th 1825.

My dear friend

How grievously am I disappointed after anticipating the pleasure of seeing you for nearly two months. I took the Steamboat last Friday evening expecting to find you in New York the next day—but having seen Mr. Halsey he said you had not yet arrived.—On Monday I saw Mr. Mortimer who repeated the same doleful information; but he had little doubt that you would be in town by noon the next day!—I had only leave of absence until Monday evening—but I ventured on another day, that I might at least *see* you.—This pleasure—likewise, was not for me.—A

thousand accidents & unforeseen occurrences took place which consumed my time, so that 5 o'clock P.M. (the hour at wh[ich] the Steam boat started) arrived & I was obliged to leave the city without accomplishing the main object of my visit! But I will not repine.—It is probably all for the best. Will you *certainly* leave New York before I could get to you? If you *will*—do, my dear friend not blame me for not managing matters better.—Believe me, my *heart* is with you & a day will seldom pass but I shall regret our separation. I pray our merciful God will prosper you in your journey & return you in his own good time to your family and friends. In great haste (for the Steam boat is coming) I assure you of my deep regard & sincere friendship.

Yours truly

JOHN. TORREY.

TORREY TO SCHWEINITZ

WEST POINT, December—1825

My Dear Sir,

I am greatly rejoiced to hear, through our friend Mr. Halsey, of your safe return after so tedious an absence. I hope you have been every way prosperous, whatever was the object of your voyage, & that you will never again be separated from us—at least for so long a time. With the exception of Caricography there has been little done in Botany since you left us. Mr. Halsey has told you much respecting the Monograph [71].—You will recollect that this work was written about two years before the printing of it was commenced, & in the interval a great deal was done in N. American Caricog. Prof. Dewey had laboured much, & so had my friends Dr. Barratt, Mr. Davis, & others. My materials in addition to what you had accumulated, were very considerable. All these I took the liberty of adding to your Monograph & wrote the whole over anew, trusting that you would be willing, on your return, to acknowledge me a joint labourer in the work. If I were not engaged in writing a Flora of the Northern States [89], which will embrace most of the *Carices* in the Monog., I would freely have made you a present of my materials—but I wish to have it known that I have done something, even in the difficult department to which our genus belongs. When I come to the subject of *Carices* in my Flora, it is not to be expected that I

shall offer much in addition to what is contained in the Monograph, & therefore I shall not appear to offer anything original there if it is not known that I contributed pretty largely to the Monog. I have several times been afraid that you would be displeased with the course I have adopted—but I could not bear to see your memoir published in its imperfect state, especially when I had the materials for much increasing its value. You will see how many species I have added from Richard[son]'s appendix to Franklin's [64] Narrative & from other sources.—These will make up for the species which have been omitted. The latter comprehends all such, concerning which there was the least doubt. You of course will add some or all of these, if you differ from me in your opinion respecting them. I do not say that they are not all new species—but that it is better to reexamine them with all the additional knowledge we at present possess.

This evening I finished the index to the Monog. It contains descriptions of 114 species—all of which I think are very distinct. Mr. Halsey has probably furnished you with a copy of No. X. of the *Annals*, & also what sheets are finished of No. XI. If not you shall have them without delay. I wish you would send a little note to be placed at the end of the work,[*] stating that it is to be considered as our joint production, & to be quoted as such—I beg you would not misunderstand me My Dear Sir,—the reason I am so anxious on this subject is chiefly that I do not wish to have it thought, by those who use my Flora, that I have collected no original materials on the subject of the *Carices*.

*[At the end of the monograph (Ann. Lyc. N. Y. 1: 374) was printed this note:

"Since the return of Mr. DE SCHWEINITZ to his native country, the Committee of Publication have been favoured with the following note by that gentleman, which they deem it proper should accompany the Monograph.

"The Monograph of the Carices, in its present shape, differs so essentially from the unfinished materials, which, on my departure for Europe, I confided to my friend DR. TORREY, with a request to make such use of them as he deemed proper, that it would be an act of injustice to that gentleman to consider him simply in the light of an editor. The judicious and elaborate amendments he has proposed, and the mass of new and valuable matter he has added, entitle him to a participation in the authorship of the work. I am anxious, therefore, that the Monograph should be considered and quoted in all respects, as the joint production of DR. TORREY and myself.

BETHLEHEM, *Penn. Dec.* 20, 1825."]

I have much to say on Caricog.—but I am in haste—my time is much occupied with the duties of my professorship.—You will be delighted to hear that *C. pauciflora* has been found in Massachusetts—as well as to see the good things that Richardson found in the Arctic Region [64]. I have many of these last, & expect daily some more northern species from Hooker. Prof. Dewey continues to publish descriptions of *Carices*, in Silliman's Journal [19], & appears to have extended his original plan so as to embrace all the species of N. Am. I told him he was interfering with us, but he does not think so.—We must not quarrel with him, for he is an excellent man—

I have your *Carices* in good order & will endeavour to send them to New York this week, that they may be transmitted to you without delay. My collection is now very extensive, & the specimens are very perfect. There will be figures of 10 Sp. to accompany the Monog. in the Annals—They will be engraved by one of our best artists.—

I shall write more soon
Yours in great haste
JOHN TORREY

REV L. D. SCHWEINITZ

SCHWEINITZ TO TORREY

BETHL. Nov 21st 1826

My dear Sir

Altho' a correspondence to me so extremely valuable & delightful as that which I enjoy with you, has been interrupted by circumstances beyond my control for a very long time—I flatter myself that there can be no other obstacle to its renewal with you, than that which caused its interruption on my part—viz. such a press of duties imperiously claiming the first attention—as deprived me of the necessary leisure. Not indeed, that I could not have found a moment for inditing a few friendly lines—but really, I have been so unremittingly occupied since my return from Europe, that I have till within a few weeks been almost totally unable to attend to my favorite scientific pursuit—from which it was necessary to draw funds, in order to give any kind of value to letters, which would otherwise have been an absolute intrusion upon

your no less valuable avocations. But I fear—& if so it admits of no excuse—but an appeal to your generosity,—that I have not even expressed to you my warmest acknowledgements for the completion of your labors on my raw material of *Carices*—which has conferred undeserved honor on me—but luckily at the same time made my materials of some value to Botany. Upon two or three species I have, I think, heretofore requested your reasons for leaving them out—I have since when studying the book [89] (for as to studying this year in that of nature during the season of the *Carices* I was utterly unable to do anything) thought that I discovered them—especially as regards my *Carex nigromarginata*—I have viz. presumed that the very distinct species so called by me—is the one you acknowledge as *C. marginata*—& my *marginata* identical with *vestita*—which probably is the truth.

In the occasional moments of leisure which I have had—I have begun for your perusal a rather extensive commentary upon your excellent Flora (I hope nothing has intervened to prevent your putting forth the second part shortly—which I most anxiously expect) giving you a full & explicit account of every thing in the northern states which I have met with, in any degree not apparently noticed in your Flora [89]—and adding as full an account of my southern observations—not occurring in other books—but my progress has been so greatly interrupted that I have not yet made sufficient advances to render it worth while to forward it to you. This winter I hope to be able to do something that way.

My European Journey & several important accessions independent thereof have greatly increased my Europ. collect. of plants. But a most deplorable stop of any increase of American specimens has taken place. Do pray inform me, whether I can hope to procure some of my desiderata thro' your further kindness without encroaching too much on your time—& whether our friend Mr. Halsey still preserves his botanical zeal—or is in danger of falling into the snares of mineralogy (I cry mercy to the professors of that honorable Science for my impertinence).

I should besides be extremely glad to get a number of specimens of certain New England *Carices* for exchange.

I hope, my dear Sir, that these lines will elicit from you some sign & token of your still taking some interest in me by letting

me know after so long an interruption whether it is in your power to permit these presents to effect a recommencement of our correspondence—for which I feel a very great longing since I have got over the extra mountains of business which had accumulated & been raised by my journey.

Pray have you heard anything concerning our friend Le Conte. Since I saw in the public papers an annunciation of the death of his amiable wife—I have not been able to learn where he is.

Accept of the assurance of my warmest & sincerest friendship & esteem with which I remain

Yours affectionately

LEWIS D v SCHWEINITZ

P.S. A few weeks ago I received a package of Musci thro' your care—apparently from Mr. Greville. At the same time 2 packages addressed to me, were lost on the road from Philadelphia—which after a great deal of trouble & expense were finally brought to light & proved to be Fungi from Dr. Fries at Lund, together with his new System [24], both packages containing the same books & fungi & both accompanied with a latin epistle the one to his old correspondent & *amicus delectissimus* the other to the *Vir doctissime*! of the same name and place of abode, whom he conceives a different person. Unfortunately, this double star—is the one of small magnitude known to you as your friend

L D v S

TORREY TO SCHWEINITZ

WEST POINT, Decr. 12th 1826

My Dear Sir,

It was not for the sake of retaliating your unkind treatment to me, that I have thus long delayed answering your last letter.—Since it came to hand I have been closely occupied with various concerns,—but as usual I have to confess some neglect. I might have taken an hour to scratch a few lines—but I always have so much to tell you & ask of you, that I keep procrastinating till I can write a *long letter*, but after all, am obliged, frequently to send you the hasty thoughts of the moment. Before I heard from you the last time, I was fearful that in some way or other I had offended you—but I was conscious that I had never de-

served your displeasure. Now I shall first answer your letter & then talk about myself.

It gives me much pleasure to learn that you are still interested in the *Carices*. There are doubtless many N. Amer[ica]n species yet to be detected. Indeed I know of several not in the Monograph [71], such as *C. praecox*, &c., besides some that you described, & which though not admitted, are perhaps distinct species. Prof. Dewey has several of yours that I thought it prudent to omit for the present. Your *C. nigromarginata* cannot be the one called *C. marginata* in the Monog.—nor your *C. marginata* the *C. vestita* of the same, The *C. nigromarg.* I left out altogether though it is described by Dewey [19], & the *C. vestita* I think is the genuine one—Indeed the last mentioned species is too distinct to be mistaken.

The promised commentary on my Flora [89] I shall greatly value. Indeed, the only way to get a perfect work, is for those who are engaged in similar pursuits to concentrate their forces. I shall always welcome liberal criticism on my book, & take advantage of every hint towards improving the next edition, should another be demanded. The 2nd vol. I shall get out *as soon as I can afford it*, for by the former vol. I have lost considerably. I have not yet sold sufficient copies to pay expenses, within $500! I have indeed a publisher who neglects my business extremely, though I paid him a high price for his work.—The book is printed & sold on my own account. Have you seen the little compendium which I lately published [87]? I will request the printer to send you a copy immediately. It is a synopsis of my larger work,—something on the plan of Smith's Compend. Gt. Britn. [80]. This I lose nothing by—So that I consider myself particularly fortunate!—

I expected you would make great additions to your Herb. by your visit abroad, & it seems I was not mistaken. If there [are] any duplicates among your specimens, I entreat you to remember an old friend. It will give me great pleasure if I can supply any of your N. Amern. desiderata, & I think it will be in my power so to do, as I have now some active friends in the Eastern States who are collecting for me. I believe I have the lists which indicate your deficiencies. Mr. Halsey has done but little in Botany since

you left this country for Europe. Poor fellow, he is obliged to attend to pursuits, quite foreign to science, & there is a probability that he will very shortly be obliged to seek new employment, as Mr. Allaire, with whom he is now engaged, is narrowing his business so that he will not need Halsey's services. I have long been endeavouring to procure him a professorship—but no good situation has yet offered. He is a fine scholar & is qualified to teach Latin & Greek—or almost any branch of nat[ural] history. Indeed he must have a situation, which will enable him to devote his whole time and talents to Nat. Science. His character in unexceptionable, & his manners are charming.

You inquire respecting Le Conte. He was in New York a long time, confined with a terrible sore leg, but at length he has got about, & I believe went to the South a week or two since. He has lately given his memoir on the violets [44] to the Lyceum, & it will be published shortly. I have some severe remarks to make on it.

That package of Musci from Greville was a very long time in New York, owing to the negligence of a friend of mine. I am glad it reached you at length.

I am now busily employed in writing an account of the plants collected west of the Mississippi on Long's exped[itio]n [91]. The whole will be arranged according to the Natl. Order. I have written much. The first part of the account is now printing in the Annals. You will be surprised to see what curious plants are in the collection—Many which were never before found north of Mexico.

Your faithful friend

JOHN TORREY

P.S. I lately heard of a very convenient way of sending packages to Bethlehem—viz. through Mr. Bininger of N. York. He kindly offered to take charge of anything for you.

SCHWEINITZ TO TORREY

BETHLEHEM March 11th 1827

My dear Sir

This time I am quite sure, that I have the advance of you—not having received an answer to my last—altho' I am far from thinking you to blame, well knowing how many avocations you have. But I am extremely sorry that I have not yet been able

to lay hold of your Compend [87]. It has not only not been sent to me as you directed—but my endeavors to procure it in Philadelphia have been fruitless—& from the manner in which my Bookseller Mr. Walter promises to get it from New York I very much fear he has misunderstood my directions, tho' I copied the title from the N. Am. review—& will get me your unfinished Flora [89]. However, I promise myself to be in a fair way of getting it at all events, nay of doing what is still more my earnest desire, videlicet, getting a peep at your own natural self. It is this delightful prospect, which causes me to trouble you with these lines. Somewhere about the 22d or 23d of this month I hope to be in New York, where I shall have some business to transact, besides seeing our worthy Bishop on board of a vessel in which he is to depart for the West Indies (by the by, the finest chance I have as yet had of getting West Ind. Plants) which will detain me the greater part of the week following the 25th but not so unremittingly as to prevent an attempt of storming West Point, supposing it possible that I could do so & return to New York in 48 hours. Now you would confer upon me a very great favor by writing a letter to me at New York, to the Care of Mr. Jacob Bininger to be by him delivered to me, informing me whether I should be likely to find the only part of the Garrison that greatly interests me ready to admit of such an attempt, & if so, when & how it could be most advantageously executed in the week after the 25th. Please inform me likewise of the address of Mr. Halsey at this time. I trust you will not find anything Arnoldish in the present negotiation & therefore grant the prayer of your sincere friend

L D v SCHWEINITZ

SCHWEINITZ TO TORREY

BETHLEHEM April 17th 1827

DR JOHN TORREY

My dear Sir

The most pleasing recollections of the agreeable, tho' short time, I had the good fortune to spend with you, would be not a little clouded by the many things I now think I forgot to converse about with you, did I not flatter myself that your kind promise of spending some part of the vacation with me, would afford an

opportunity of repairing these deficiencies. I trust nothing will turn up to disappoint me in the sanguine hope of seeing you here & beg you would be so kind as to give me precise notice of your coming a little before, in order to enable me to arrange matters so, that I may be able fully to enjoy one of the greatest pleasures I can anticipate. In the hurry of my leaving you I unfortunately forgot the Index of my Herbarium—which I should be very anxious to get as soon as possible & regret that I did not mention it to Mrs. Torrey when I had the pleasure of waiting upon her to deliver your packet in the morning after my arrival at New York—as I might then probably have received it before I left the city. I should likewise be much obliged to you if you would take measures to have the Ten Dollars for Schwägrichen [66] paid to my account in the *Union Bank* & give me notice thereof.

Concerning the Fungi you were so kind as to give me I beg leave to observe that there are among them five or six new ones, together with a larger number of such as are rare to me & have not ever been found by myself, tho' I had previously received them from you. You desired me to return you the duplicates where such could be made out—& I now beg to know whether you wish to have pieces of all those I received from you—or only of those I have determined as new & whether you are content to wait for them until you come here—or desire them to be forwarded immediately. So small a packet I fear would be liable to be lost. I am glad to find that I can spare you 2 or 3 specimens of our German *Sclerot[ium] vaporarium*—& will try to enclose a few of my *S. medullare* in this letter—which I found in the hollow of some Syngenesious plants in a garden—occupying the place of the medulla. It is rather the largest species of *Sclerot[ium]* I have met with in this country.

A press of business obliges me to take abrupt leave of you with the assurance of my sincere respect & friendship & I hope you will ever consider me

Yours affectionately

L. D. v SCHWEINITZ

SCHWEINITZ TO TORREY

BETHL. Dec 5th 1827

My dearest Sir

Let me entreat you—unless for reasons which I cannot divine, you should have resolved to break off a correspondence to me so valuable to afford me the consolation of a few lines. I have already understood that the severe disappointment I met with, by your not coming hither during the vacation—was probably owing to your translation back to New York & Mr. Halsey informs me, that there you do intend to devote yourself further to Botany—both pieces of intelligence in the highest degree pleasing to me. I must inform you too, that very soon after the time in which I had prepared my house & Collections for your accomodation—I was seized during the Botanical expedition I at length undertook without you—with a severe indisposition, which for 5 weeks incapacitated me altogether from doing anything of consequence, from which I however recovered in time to collect considerably of our fall treasures. A very extensive plan concerning Asters & Solidagos which I intended chiefly for you—was however nearly prostrated again by an interruption which I could not help—during which the mould got into my specimens & almost ruined them—but I was further prevented from completing it—by a journey I had to make from Oct 2 to Nov. 3 to Lake Erie—unfortunately too late to admit of much botanical exertion (besides continual rain) but interesting nevertheless on acc't of the Geography of some plants which I had occasion to observe at least in their ruins. In the letter to Mr. Halsey in which I enclose the present—I state to him what I am now able to furnish. I am sensible that my recent collections contain nothing you could want—except perhaps 3 or four to me doubtful things which I shall lay by at all events. Should you, however, observe anything desirable—be sure it is at your comand. But I have always calculated upon going thro' my whole collection with you—& whenever that is the case nothing in it anyway divisible so as to be satisfactory to you, shall be spared. Permit me to remind you of your kind promise concerning the White Mount[ain] plants—or anything else any way calculated to augment my collection. I have been sorely disappointed in not receiving the European col-

lect[ion]—promised me & on the way. I fear it is lost. Dr. Hooker has however sent me his Monograph on the British Jungermanniae [33].

Let me know if you please whether you at present have any botanical plan in view, in which I could assist you. Besides putting all things in order—the one I propose to prosecute next is a review of my whole collection—with an especial eye to your Flora of the North. States [89] & for the last classes [of] your Compend—noting everything I have knowledge of—from your precinct—which I do not find there.—If I suceed in completing these remarks during the winter, it is my intention to communicate them to you & to accompany that communication by a transmission for your examination of an extract from my collection of all the specimens upon which my remarks are founded—which I shall beg you to return—when you have made such use of them as they may afford. Please to give me your new direction & believe me at all times yours

affectionately

L D v SCHWEINITZ

TORREY TO SCHWEINITZ

NEW YORK, April 3rd, 1828

My Dear Sir,

I really do not deserve to be numbered among your friends—so negligent have I been to you for many months past. Time after time have I resolved that I would sit down & write you a letter, although it should contain but a few lines—yet I have postponed it again & again, chiefly because I had no sufficient excuse for my neglect—but partly because I could communicate nothing that would particularly interest you. Since last August my time has been fully occupied. The change in my affairs imposed new duties on me—& from the time that my lectures in the college commenced, until lately, I have had no leisure to correspond, or indeed to attend to anything but Chemistry. At length, however, I am released, & I am deeply engaged in botanical pursuits. Often have I thought of you, My Dear Sir, as I occasionally peeped into a package of plants (for I kept my herbarium in a room adjoining the laboratory in the Med[ica]l College), or when I turned my eyes towards a pile of unanswered letters, that laid for several months on my table. I indulged the pleasing hope last week that I

should see you in a day or two, "*face to face*" & have a good long botanical talk. I left the city for Philadelphia, with my brother, with the design of visiting Bethlehem before I returned—but circumstances rendered it necessary for me to proceed directly home, disapointed in my fond expectations.

My time, at present, is almost entirely taken up with the arrangement of my herbarium. I have purchased new paper portfolios & cases sufficient for all my plants—& have already done much toward placing my collection in a state fit to be used. I think it will be one of the most elegant in our country when it is finished.

Since we last met I have received some fine accessions—Of both indigenous & exotic plants—I have a large package from Dr. Scouler, of specimens collected on the N. W. Coast of America, but unfortunately there is scarcely a duplicate among them. When I was in Philadelphia, I examined the collection of plants brought home from Long's 2nd Expedition & made some notes which I should be pleased to show you, for I find that we differ about a number of species.

You enquire in your last letter (dated Decr. 5th, for which I have yet to thank you!) whether I have any botanical plans in view:—I have several—which I will now detail.

1. The Seacoast of New Jersey has not yet been thoroughly explored. It has only been examined at one or two points, & these, (with the exception of the neighborhood of Tuckerton) have not been exhausted of their treasures. I propose to spend several days, either alone, or with such friends as I can persuade to accompany me, on different parts of the sea-coast of this State some time in the month of July.

2. I propose to send some person to the coast of Maryland. Dr. Pickering (a very promising young botanist of Philadelphia) thinks he will be able to visit this region the present season. An abundant harvest awaits him—& he will collect enough for all his friends. This part of the coast will probably afford many Southern plants, wh[ich] have not yet been recorded as extending so far North.

3. My next plan is pretty extensive.—Many of our botanists are exceedingly desirous of obtaining plants from the regions west

of the Mississippi—& Some of them, with whom I have conversed on the subject, have ageed to contribute towards defraying the expense of sending a person to collect specimens.

Mr. Nuttall thinks that we may procure a collector on very reasonable terms in England or Scotland & he promised to bring out with him, in the Spring, such a person, if he could find one of the proper description. I propose that we take the specimens of him at a certain rate,—say at five or six dollars the hundred—the specimens to be divided into lots when the collector returns. He can bring home living roots, & seeds, which will be a sufficient remuneration for his time & labour, independent of what he can make by the dried specimens,—for the country to wh[ich] we propose sending him, abounds in new & most interesting plants. If the person were quite poor, we might contribute each a few dollars, in advance, for wh[ich] we can receive an equivalent in plants. Tell me what you think of this & the other plans.

Mr. Halsey is pretty active in Botany, but he is unable to do so much as he desires, from want of *the needful.* Poor fellow, he has a large family to support, & his only income is a pitiful salary wh[ich] he receives from one of the banks. I would rejoice to see him snugly settled in some professorship. He is well qualified to teach Natural Hist[or]y, Greek, & Latin, & the higher branches of education generally.

Do write me soon, & let me know what you are doing & whether I shall have the pleasure of seeing you soon in N. York.

Yours most sincerely
J. TORREY

SCHWEINITZ TO TORREY

BETHLEHEM April 11th 1828.

My dearest Sir

This happy moment puts me in possession of your kind favor of the 3d instant—& I embrace a moment's leisure to answer it immediately, in order to assure you that it gave me the most lively pleasure, excepting only that passage of it which informs me of the frustration of your plan of calling here & thus deprives me of one of the greatest enjoyments I long for. Do, I most earnestly pray you, contrive in some of your vacations to grant

me a few days—I know it would prove a matter of the utmost importance to me, & might afford me some chance of useful interchange. I am glad to learn, that you are arranging your herbarium—don't forget me & my desiderata in so doing. I must confess I am almost in despair about my botanical exchanges just now. Within the last three weeks I have with great exertion made up large packages for Dr. Hooker, & Mr. Greville & forwarded them to Mr. Bininger by the Brunswic[k] stage. They have not arrived I hear at New York, & are probably lost. I fear as much for a package of several hundred North Carol[ina] plants forwarded since to our friend Mr. Halsey accompanied with about 500 Spec. mostly new Fungi, which he was to share with you —because I hear nothing from him about their arrival. I am this day forwarding another package to Baron Lederer & feel very ill at ease to think all these things lost which have cost me so much time & labor to collect. The communication of your botanical plans was to me in the highest degree interesting. If it was possible to give me notice a week or two beforehand & to arrange a point of meeting, it would be one of the most agreeable things I can imagine to accompany you in the excursion on the Jersey shore. The coast of Maryland is I think quite a new field.— If possible, may I put in a claim to join in the fruits of that expedition & still more in that west of the Mississippi—? I would be most happy to be considered a contributor to the plan in a pecuniary way to the extent of my means.

The latter part of the winter I have been employed as much as my duties allow in writing a new descriptive Synopsis of my Fungi [76]—but have not yet got thro', tho' nearly, with the monstrous genus *Sphaeria*. It is my purpose to continue—& finish it next year, with drawings of all & every new one. What is to become of the work when finished I have not yet determined.

During the whole of last year I have been very unfortunate in my desire to encrease my collection. Not one of the foreign supplies promised has come in—& at the best season for doing something personally—indeed during an attempt—I was seized by an indisposition which utterly incapacitated me. When recovered— & a fine prospect arising—my duty obliging me to travel to the North West Corner of the State on Lake Erie. Untoward cir-

cumstances deferred this journey until late in October—so that vegetation was entirely gone.

Do me the favor to enquire of Mr. Halsey concerning the arrival of my package, which left Easton on the 31st March—& I advised him thereof by letter & permit me once more to beg you & him, to try to do something for me. Knowing, however by my own experience how difficult that is—when duties occupy so great a portion of time—I can readily account for it—if you find it out of your power. Within a few weeks I expect to go to Philadelphia —if possible I should be very glad to become acquainted with Dr. Pickering. Can you furnish me his address ?

Excuse these hasty lines, designed only to express to you my extreme joy at your resuscitation—after so long a silence—& my warm desire to participate in the plans you propose. Believe me

Yours most sincerely

L D v SCHWEINITZ

TORREY TO SCHWEINITZ

NEW YORK, May 1st 1830—

My dear Sir

Yesterday Maj. Le Conte read me a letter which he had just received from you. I was rejoiced to learn that you expected to spend a few days in Philadelphia in the middle of this month, for I hope to be there about that time myself. Perhaps we can make arrangements for a trip to Quaker Bridge and examine the early vegetation of that interesting region. I will endeavour to be in Phil. on the evening of the 16th inst. so that we can take the Tuckerton Stage early the next morning, and arrive at the *Bridge* in time to collect many plants before night. I must return to Phil. early enough to take the steamboat for Trenton on the 20th, for I am engaged to give a short course of chemical lectures at Princeton College, which will commence on the 21st inst. There will not be many rare plants to find in the pines—but if we only found *one* it would be worth while to go.

Ever since our lectures closed at the Med[ica]l College (March 1st last) I have been occupied in arranging my herb^{m}. It was necessary to put my materials in order before sitting down to write the continuation of my Flora [89], and I have hardly made

the arrangements for resuming this long intermitted work, when I must postpone the subject again for a few weeks till my business at Princeton is closed. I have often told you before, that I must attend to Chemistry, because I get my bread by it, and I love it very, *very* much. Yet I love Botany more if I may judge by the comparative zest with which I pursue the two studies. Perhaps, however, if Botany were my task, and Chemistry were my *play*, matters would be reversed.

I have many things to say to you, but cannot tell them to you now, as I must close my letter in time for Maj. Le Conte to take it with him to Philadelphia.—When we meet there we shall have, I hope, some long talks respecting our favorite science.

Since I commenced the above I have seen Major L. C., who informs me that he will not set out for Philadelphia till Monday; so that I can write to you a little more in detail.

With regard to domestic botanical news, I must be very brief. The number of votaries of Flora in N. York is now reduced to two, viz. Mr. Halsey and myself. Maj. L[e] C[onte] has given up plants, he having gone so far as to announce that he will never write another botanical paper! Cooper has deserted our ranks and has presented his whole herb^{m}. to the Lyceum. At present he devotes himself to the study of ornithology and organic remains. Halsey, poor fellow, is so much occupied with matter foreign to botany, that he can do but little for the science—at least his studies are so loose and interrupted that he cannot undertake anything like a monography or Flora. For myself, I hope to do something effectual before autumn next—perhaps prepare a half vol. of my 2nd vol. [89] for the press. I am constantly receiving fine collections from various quarters—tho' since I saw you last winter, I have had few accessions of *indigenous* plants.

I know of no botanist at the North who is actively engaged but Mr. Oakes. He is a *hard-working* naturalist, and will certainly produce something creditable to himself and the country in the course of a year or two. He is preparing a Flora of N.

England—but does not intend to publish it for several years; Some Monographs will probably appear first.

Dr. Lewis Beck has not yet given to the public his promised work on the Ferns & Mosses of the United States [8]—nor do I think it will appear very soon. I do not see how it is possible that he can be qualified for so difficult a task as the one wh[ich] he has undertaken. The only essay he ever made of his powers in CRYPTOGAMOPHYTOGRAPHY is his paper on the "GrevilleaNUM" published two or three years ago in Silliman's Journal [9], a moss which turns out to be the *Timmia Megapolitana*! His catalogue of Ferns is by no means complete, and that of the Mosses, very imperfect. He made out the latter from Schwägrichen's book [66], marking every species said to have been found in the United States.—

By the way, speaking of mosses, I have now in my possession, a beautiful collection of about 300 mosses collected by Drummond in the British possessions of N. America and named by that botanist under the immediate eye of Hooker.[*] The plants are beautifully put up in three bound volumes with a manuscript catalogue & index. A few Sets are for sale still, I believe, in Scotland. I shall take immediate steps to procure a copy—the one which I have in my study has just arrived for a gentleman at the North & is intrusted to my care.

Have you heard of Hooker's new work on the plants of British America [34]? It includes all the plants collected by Richardson in Franklin's 2nd exped^{n}—together with every thing before published concerning the botany of the region mentioned. The 1st No. in toto with numerous excellent plates has been received by one of our booksellers, but we are all too poor to purchase it—especially as in doing so we must subscribe for the subsequent no^{s}, of wh[ich] there will be 12. The price of each is $6.! The plants are arranged according to the natural order—& there are many

*[Hooker, Sir William Jackson. Notice concerning Mr. Drummond's collections, made in the southern and western parts of the United States. Jour. Bot. 1: 53 (footnote). 1834.

"'Musci Americani, or dried specimens collected in British North America, and chiefly among the Rocky Mountains, during the Second Land Arctic Expedition, under the command of Captain Sir John Franklin, R. N., by Thomas Drummond, Assistant-Naturalist to the Expedition.' In 2 volumes, quarto."]

new species.—Hooker has also commenced a very useful work called the *Botanical Miscellany* [10]. There is an excellent work entitled The Magazine of Natl. History [50] edited by *Loudon*, in London—It comes out every two or three months, is quite cheap & contains much botany.—You probably have seen the enormous, but most excellent book by the same editor, entitled "Encyclopedia of plants" [49]—comprising an account of all plants cultivated in Britain, together with the natural species—a single vol. of nearly 1300 pages, very fine print, large 8 vo.—with 1,000 cuts in excellent style, of about 10,000 species. The work was prepared by Lindley, who has filled it with interesting matter—The price is $25 or $26. Lindley is preparing an introductory work on the Natural Families of plants [45]. He has lately pub. a Synopsis of the British Flora [47], containing description of the phenog. plants and filices of Gt. Britain, in nat. orders.—Hooker has ready a British phenog. Flora according to the Lin. Syst. [32].

The plants &c. sent home by Dr. Gates are worth but little—they comprise a few things which he collected very early last spring near N. Orleans, and some given to him by a collector who picked them up in the same district. Le Conte and I divided them by lot among our subscribers. Almost the only interesting articles among them are a new (or perhaps Mexican) species of *Campanula*, allied to *C. simplex*—and some good specimens of what I take to be your *Thelephora coccinea*—Syn. fung. car. inf. I find it to yield a beautiful scarlet to alcohol or water, which may be used as a dye, that resists both acids and alkalies. Dr. G. lost the whole of last season by severe and long protracted sickness, but he will remain another season in the country, and believing himself to be now acclimated, he hopes to be successful in making large and valuable collections before next autumn.—

Yours truly,

JOHN TORREY.

TORREY TO SCHWEINITZ

NEW YORK, April 26th 1831.

My dear Sir,

It is a long time since I had the pleasure of receiving any communication from you, though I hear that you write occasion-

ally to our friend Halsey. I know not why you have ceased your correspondence with me,—for I always valued it, & found it very profitable. My last letter to you was written about a year ago.—I then proposed that we should make an excursion to Quaker Bridge together, & knowing (or rather understanding from some of our friends—I forget who) that you was to be in Philadelphia about the middle of May I proceeded there, in the expectation of seeing you—but you had left the City.—Perhaps you never received the letter to which I allude.—And now my dear Sir, whatever may have been the cause of the long interruption in our correspondence, I hope it may be renewed, for I have turned again to my botanical studies with great zeal. Since I came to New York my time has been very much taken up with the duties of my station as Prof^{r}. of Chemistry in the Medical College—but my business is now arranged so as to allow me leisure to prosecute Natural History with advantage. If you will allow me to say a few words more about myself I will inform you that I have been writing for the 2nd vol. of the Flora of the Northern States [89], so long laid aside. I have also been arranging my Herbarium, & making myself acquainted with some branches of botany which I had too much neglected—particularly the Natural Classification, now apparently about to supplant & throw out of use, the Sexual System of Linnaeus. We have no other botanists besides Halsey & myself—for Le Conte can hardly be called a New Yorker—& Cooper has relinquished the study of plants.—Of course I have but little botanical news to send you—

You have heard that Dr. Eights, whom the Lyceum sent out in a vessel bound for the S. Seas, returned last fall without having accomplished much, for it turned out just as several of us suspected, that the Expedition was destined, not for discovery, & for scientific purposes—but to *catch seals*!

Dr. Gates, sent out by an Association (of which I believe you a member) to the countries west of the Mississippi, has done as yet but little better, for he lost nearly a whole year by sickness. Early last spring, while recruiting at New Orleans, & while still very feeble, he received the offer of a professorship in some literary Inst^{n}. in Mobile, which he accepted. He has lately written to Cooper, informing him that he collected last year about 9000

spec^{ms}. of plants, in different parts of Alabama, & that we ma- expect part of them very soon. He promises also to collect al in his power, during the present season,—so that we may yet get something for our $650.

After so much about unsuccessful collectors you will not perhaps wish to hear of a new proposition—but I will venture to mention it to you. Mr. Drummond, the celebrated collector & muscologist, who accompanied Franklin & Richardson on their 2nd Exped^{n}, has just arrived here from Scotland, bringing me letters from Drs. Hooker & Greville. Mr. D. is about proceeding on a journey to the West of the Mississippi for the express purpose of collecting specimens in all the branches of Natl. History *for sale to any who chose to purchase* them. He expects to spend several years in this country, & to explore all those parts which have hitherto been little or not at all examined. Many gentlemen in England & Scotland have engaged to take full sets of all that he collects & Dr. Hooker has fixed the price for the plants—which tho' rather high is not extravagant for rare new ones— & viz. £2 per hundred. He will allow American botanists to make selections of such plants as they need. You may calculate to what an extent Mr. D. expects to collect, when he has sent out to New Orleans, two tons of paper. Mr. D. asks nothing in advance but he would like to form some estimate what number of specimens would probably be taken in America.—He will leave here in a few days & [if] you would like to engage two or three hundred specimens please let me know. Dr. Hooker has kindly sent me a set of Mr. Drummond's mosses, collected in Franklin's 2nd journey—about 280 species—many quite interesting.[*]

Have you seen Hooker's Flora Boreali Americana [34]? Several copies of No. 1. are in our shops. The work is dreadfully expensive—4to. 20 plates each No. for $6.50—There will be 12 nos. It is beautiful. I have a copy. Carey & Lea ask $7.50 per No.

I am printing an American ed^{n} of Lindley's new work on the "Natural System of Botany" [46] & will give an appendix containing the North Am. genera with the no. of species as far as now known, arranged according to the improved nat. orders. & now my dear Sir, I will ask a favour of you—which is a list of N. Amer.

* [See footnote, p. 245.]

genera of fungi & the *no.* of species (not their names) belonging to each—also the *authority* for the genus abridged.

I remain
very truly yours,
JOHN TORREY—

REV. L. D. SCHWEINITZ
Bethlehem
Pennsylvania

SCHWEINITZ TO TORREY

BETHLEHEM May 4th 1831

My dearest Sir

I can truly say, that the reception of your kind favor of the 26th ult. (which unaccountably took place only last evening) gave me as much pleasure as pain. The former on account of the delight of recommencing a correspondence with my most valued botanical friend in America & the latter on account of the interpretation you might conceive my long silence & especially my neglect of your kind letter of last year liable to. Alas! I was not aware that you were ignorant of the cause of the latter—which from the time I received yours to within about two months past entirely disabled me from any exertion whatever. I left Philadelphia in a hurry on account of the violent breaking out of an indisposition I had felt for some time coming on & my chagrin was not a little augmented by finding at home your letter, which apprised me of the disappointment I had unwittingly prepared for you, which at the same time was as great a one to me. But I was soon incapable of feeling the regret, for besides some alarming symptoms of another kind I became extremely debilitated & with little interruption experienced a depression of spirit such as I had before been an entire stranger to, until the commencement of December. Scarcely had that left me, & enabled me to resume my duties & my studies, when it pleased God to visit me with still more serious bodily complaints by which until the comencement of March I was strictly confined to my room. During this tedious spell however I had every reason to be thankful that no relapse of mental depression took place. On the contrary I was enabled to be active with my pen & among the rest completed

the Synopsis of the American Fungi [76], containing description of about 1500 new species & remarks upon the whole number of 3000 Am. species as yet observed by me. That I did not forget you, my dear Sir, I hope to be able to prove to you—for among the rest I put by for you upwards of 200 species of very beautiful specimens of Surinam plants[*] with such determinations as I have been able to make out—& the box now stands ready to be forwarded to you by the first opportunity that occurs, as I requested Mr. Halsey to inform you, when about a month ago I had the pleasure of receiving a letter from him, the first voice from any botanical friend after my indisposition. I trust that you will now excuse my apparent neglect. My health is not yet by any means reestablished on a sound basis—accordingly about the middle of this month I shall commence by the advice of doctors a long journey & have chosen the westerly direction, proposing to go as far as the state of Indiana It is by no means improbable that I shall return by way of Lake Erie & in that case hope to have the pleasure of seeing you some time in July. I have prepared myself if my strength admits to botanize on this journey with as much zeal as possible. Having now given you some idea of the last lost year—& the candid assurance that your kind letter proved to me a most encouraging omen that my hopes of being fully reinstated among the rest in my botanical enjoyments, permit me both to answer it & to mention some other matters. In the first place concerning my Synopsis [76]. It was my intention to forward it imediately for publication to France or Germany (tho' somewhat appalled under present circumstances by the well known adage *Inter arma silent litterae*!) But during my last visit to Philadelphia a fortnight ago (where by the by I again missed seeing you as I had been led to hope by Dr. Pickering) I was so urgently requested to submit the work to the Philosophical Society, to be published as their next volume, that I left it in their

*[There seems to be no record of the source of the Surinam plants placed by Schweinitz in his herbarium and distributed by him to correspondents. There is no doubt that they were sent from Surinam by Dr. Constantin Hering (1800–1880), who soon afterward settled in Philadelphia and became one of the founders of homeopathy in America; but some or all of them were probably actually collected by Christoph Weigelt, who was associated with Hering in the exploration of Surinam, and who died there in 1828.—J. H. B.]

hands & have since received assurances that it would be published so as to appear at the end of the year. If it is so finally determined, I shall be glad as I would prefer its being published in America. Upon the expressed wish of Mr. Halsey I have yesterday forwarded to him, my scrawl from which the Synopsis is composed—in three bound manuscript books. I am thus deprived of the means of correctly answering your request of giving you a list of the N. Am. Genera with the number of species—& beg to refer you to Mr. Halsey—who will I trust let you have the perusal of my books (written carelessly indeed both as to latinity & handwriting) & thus enable you to extract them yourself. In my work for publication I have made some few alterations in the arrangement & adopted some new genera established by Fries in his recent publication on the whole vegetable kingdom[24]—which I am very sorry I did not send on—as it would be highly interesting to you. The number of species however is almost entirely the same—except that I have here & there omitted a few, which did not appear sufficiently ascertained. Nothing will be more eagerly expected by me than the book you are publishing on the natural orders.—As regards the Fungi—the perfection of the System is really admirable & I do most sincerely regret not having sent on to you Fries' work [24] which comprises not them alone, but the whole of the Cryptogamia. No opportunity will offer before my journey; otherwise you should still receive it. Tho' you say that you have little of bot[anical] news to communicate I was unusually gratified by what you do impart. Can there be a more pleasing piece of news than that you have resumed the publication of the 2d Volume of your Flora [89]? On my return from the westward, if it be not too late, I should like to send you for inspection everything that my Herb. contains, that would be of use in making it complete. Let me know if you would wish it. The hopes you hold out concerning Dr. Gates—are gratifying. I hold three shares in the association. LeConte & yourself are appointed to act for me. A German adventurer took me in last fall upon a similar plan. His name is Voltz—but I have not heard a word from him. The proposals of Dr. Drummond are indeed of a different kind & so tempting, that notwithstanding impoverished circumstances I cannot help requesting you to secure for me the

right of getting two hundred species from him on the conditions proposed, begging you kindly to undertake their selection for me. I have seen Hooker's work [34] at Carey & Lea's. It is however quite beyond my means.

As you have lately arranged your Herb.—I hope you have found some trifles for me.—Indeed, my dear Sir, permit me to beg that you keep me in good remembrance, when anything especially American, falls in your way. I trust when you receive the Surinam plants, you will give me credit for my own remembrance of you. Anything foreign will be acceptable likewise. Should I be lucky in my western expedition, you may rest assured that the second specimen of anything I can procure is regularly laid by for you. God grant that my health may be so improved by my journey as to render me able to botanize. My legs are still very feeble, but I am accompanied by my cousin [nephew], who has a little smattering of botany. I propose to forward the box with Surinam plants to you with the direction to be called for at the Easton Stage office kept by James King, No 7 Cortland Street, & if I can find an opportunity before I leave home I will put into the box Fries, Syst. Orbis vegetab. [24]—for your perusal.

This moment I am interrupted by a very acceptable letter from Mr. Greville, Edinburg, who informs me that he has forwarded to me the plates of his work on the Filices [37], addressed to your care by a Mr. Davidge of Baltimore. Should you have received that parcel I beg to request that you may be so kind as to deliver it at Mr. Van Vleck's, our minister, Dutch Street, as within a fortnight I shall have a fine opportunity to get it from him.

I remain yours most sincerely
LEWIS D V SCHWEINITZ

SCHWEINITZ TO TORREY

BETHLEHEM July 31st 1831

My dear Sir

On the 21st instant I have happily returned from my ten weeks tour in the western country which proved very beneficial to my health (altho' unfortunately during the last days I have again caught a violent cold, which threatens in part to deprive me of those benefits) & extremely delightful in every respect. It has

not indeed been productive of many new plants—of the few I have I propose to send you a list—but nevertheless full of botanical enjoyment, by giving me a very satisfactory Idea of the Botany of the regions I passed thro'. I hope you safely received the collection of Surinam plants which I forwarded to you just before my departure. On my arrival I found the valuable work on the Ferns from Greville [37] which you have kindly forwarded & beg to express my thanks to you. Permit me to enquire whether anything further concerning Dr. Gates' collection has transpired—or whether you have anything on hand for me, as on the 12 or 13 of Aug. my friend Rev. W. H. Van Vleck of New York proposes to leave there for Bethl[ehem] & would favor me with his kind attention to anything you might think proper to send. In hope of soon hearing from you I remain yours

most respectfully
LEWIS D v SCHWEINITZ

TORREY TO SCHWEINITZ

NEW YORK, May 14th 1831.[*]

My dear Sir,

A day or two after I dispatched my last letter to you, & before your most welcome epistle was received, the parcel for you from Dr. Greville was left by some unknown person at my house.

I took it with me to the city for the purpose of leaving it at Mr. Van Vleck's who I supposed resided in that Green Street (for we have two streets of that name!) which is near his Church—but no Mr. Van Vleck was to be found there, & as I had some business further in town, I left the bundle at Mr. Thorburn's seed-store till I should return. Mr. T. immediately offered to forward it to you safely, & I concluded to leave it in his charge, but now I am in doubt whether I did right! I think I will call on Mr. Van Vleck tomorrow & request him to take care of it. You are probably the only *botanist* who at present owns a copy of this rare & costly work [37]. There are two sets in one of our bookstores but the price is so great that none of us can afford to purchase them. I have, however, the prospect of obtaining an uncolored copy from Greville, in exchange for a quantity of our native

* [Mailed August, 1831; see next letter.]

plants, on terms wh[ich] are easy to me. The Authors have figured but few N. American ferns. Their *Woodsia Perriniana* is exactly the plant which I have called *Hypopeltis obtusa*—the *Aspidium obtusum* of Willd. & Muhl.! Some specimens by mistake found their way among a collection of West Indian [plants] made by a M. Perrin. One was sent by me to Sprengel several years ago, who named it *Alsophila Perriniana*. Another, named according to Sprengel, was transmitted to Hooker—who has given a very good drawing of it in his work. The plant is, however, not a native of the West Indies at all, & is doubtless the species of *Aspidium* named by Willd. & Muhl. *obtusum*. The indusium is not *upon*, but *beneath* the *sori*, as in *Woodsia*, but I thought it differed so much from the other *Woodsiae* that it was proper to make a new genus for it. But upon the whole I am now inclined to follow Hooker in altering the generic character of *Woodsia* so as to receive the present species & its name must be *W. obtusa*.

I congratulate you on the completion of your Synopsis of N. American Fungi [76] & hope you will urge the publishing committee of Phil. Society to have the work printed with expedition. Mr. Halsey will doubtless allow me to use your rough copy of the Manuscript for the purpose of making out the list of genera that I requested of you.—The promise of the loan of Fries' work on Cryptogamous plants [24] I am very thankful for, & I hope you will forward it to me as soon after your return as may be convenient. It shall be carefully preserved & returned in a short time. Please inform me in your next letter what is the price of the book, & the best method of obtaining it.

I sincerely hope, My Dear Sir, that your intended journey may be the means, by God's blessing, of restoring you to perfect health. I did, indeed, hear that you had been in poor health, last summer, but it was my impression that you had long since recovered & had resumed your scientific pursuits. Hence the remarks in my last letter, which I very much regret caused you the least pain. You will pardon them, however, (I trust) when you know that they were elicited by the sorrow I felt, under the impression that so good a friend as you, had for unknown reasons seen fit to suspend his communication with me.

When I had written thus far, I was interrupted by the postman's bringing in your letter of May 10th, informing me of the transmission of the promised box of Surinam plants, & of Fries' much desired work [24]. Surely I have another proof of your enduring friendship, in thus remembering me in the hurry & occupation necessarily attendant on the setting out upon a long journey. You will be much in my thoughts till you return, & I pray may be restored sound in body, & richly laden with the Lord's grace, to your happy family.

In less than a fortnight I expect to start for Princeton in N. Jersey where, (I believe I informed you) I am engaged to give a course of lectures on Chemistry, to occupy me ten weeks. I shall be in a good botanical region & not far from the famous Pine barrens. Three active young men are to accompany me as pupils, & I hope to make them very useful to me in preserving a large quantity of botanical specimens.

Your request respecting the collections which Mr. Drummond expects to make, shall, (D.V.) be faithfully attended to. I shall order duplicates of the very species which I desire for my own Herbm. & I very much doubt whether I shall be able to obtain more than the number you mentioned. At any rate it seems quite out of the question for me to go beyond 300 species unless I can tempt him with some of our New England Mosses in the way of exchange; for Mr. D. was quite surprised to see so many kinds from that part of the country in my collection, that he did not meet with in his journey to the North, & he wished much to obtain a large supply of them.

I remain, My Dear Sir
Yours respectfully & affect[ionate]ly,
J. TORREY

NEW YORK, August 13th 1831.[*]

My Dear Sir

On my return to the city a day or two since, after an absence of nearly three months, I found your acceptable letter of the 31st ult. It gives me sincere pleasure to learn that you have been preserved during your journey & have returned safely to your

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* [Inclosed with the preceding letter.]

family—yet this pleasure is mingled with regret that you have since suffered from a cold which may deprive you of the benefit derived from travelling. I hope, however, that you will soon be restored to perfect health.

The box of Surinam plants came safely, as I believe you are informed in the letter accompanying this—(which was written before I left the city & not forwarded thru' negligence).—If not, be pleased to accept my thanks for your very liberal present. The parcel from Dr. Greville I left in care of Mr. Thorburn of this city, who said he transacted business with you & would forward anything to you—with pleasure.

Since my return I have seen none of my New York friends—having been incessantly employed in putting my house study in order, & in answering letters—of course I have not had an opportunity of enquiring about Dr. Gates' plants. It is my intention, however, to call today on Mr. Cooper (who conducts the correspondence with Dr. Gates) & learn from him whether the boxes have arrived.

During my stay at Princeton I was diligent in collecting plants, but my research for new species was not successful. The region is very much like that of Bethlehem, as far as I can judge. The few rare things which I found shall be shared with you as soon as I can arrange my collection which will be next week, if I am spared.

My visit to the pines of N. Jersey in May last was quite a pleasant one—but I found no rarities.—If possible I must make a trip to the sea coast of N. J. in two or three weeks—as I have never visited that region—at least not south of Squam inlet. Could you not make it convenient to go with me? I would meet you at Tuckerton at any time that you might appoint.

In a few days I hope to complete a small collection for you.—In the mean time remember me if you are arranging your last collections, & believe me

Yours most respectfully

JOHN TORREY

TORREY TO SCHWEINITZ

NEW YORK, August 26th 1831.

My dear Sir,

Two or three weeks ago I left for you, at the house of Mr. Van Vleck in this city, a letter & small parcel (containing Fries' work

[24]) which, I suppose, were received by you in due time. Since then I have made another visit to the country with my family, so that my botanical & other studies have been interrupted.

I am now finishing my edn. of Lindley's Work on the Natural System of Botany [46]. The Appendix concerning which I have written to you before is partly in type, but the printers proceed very slowly. I have obtained your *mss* volumes on N. Am. Fungi [76] from Mr. Halsey & have made out a list of the genera,—but not until I had sent off the vol[ume] of Fries'. In "Cohors 6 (Hyphomycetes)", series 2, 3, 4, 6, & 7 are not named—is this an intentional omission?

I have made out a list of the Musci & Hepaticae, in which I should differ, perhaps, from some of my friends, respecting the arrangement & number of Species—but it seemed to me better to include none but such as are well ascertained.—The order Algae is very small—that class of plants having received but little attention from our botanists. I should take it as a very particular favour, My dear Sir, if you would furnish me with a list of the species which you have found, or know to inhabit N. America, named according to Agardh's Systema Algarum (3). I expect the number is so small that it will not require much time to make it out.—Yet I would not trespass even this much on your hours of study, were not the object so important.

I suppose you have seen the 2nd No of Dr. Hooker's *Fl. Bor. Amer.* [34] which proceeds nearly through the Caryophylleae (following the order of De Candolle)—The estimable author informed me last May that he had just finished the 3rd No. wh[ich] concluded the Leguminosae. This work throws much light on N. Amer. botany & will be of great service to the one who shall write a general Flora of our Country.

We have but little botanical news here—Indeed I stand almost alone in the Science—for Mr. Halsey is so much occupied with business that he cannot prosecute his favorite study with any advantage to himself or others.—I told you before that Mr. Cooper does not attend to botany any more, except to look over a new work when one appears. Le Conte can hardly be called a New Yorker—for he is rather a cosmopolite. There is scarcely any one who takes an interest in my labours, & were it not for

my friends at a distance, I should feel but little pleasure in my work.

This season has not enriched my herb[ariu]m very much—A few parcels of plants have, indeed been received, but none to equal your fine collection of Sumatra [Surinam] specimens. It would greatly delight me to reciprocate this favour—but you must wait till opportunity offers. In the mean time I will lay aside for you such plants as I fall in with & which I think you would like to have.—I have not yet got into my hands a collection from Kentucky which was in the city six weeks ago, & has gone to Albany, where it was sent with the gentleman's baggage who brought it for me from Lexington—I hope to have it in a very few days, when I shall be able to spare you some of the duplicates which I am told it contains.

In my list of N. Am. genera I have put the name of the author after each genus.—but in the catalog. of Fungi from your Mss [76] I found few of the genera with any name appended. I suppose it will answer, to state, that the system followed is that of Fries, & that the genera which are adopted are his, except those marked with your own name. In the hope of hearing from you soon, & hearing that your health is established, I remain. My Dear Sir

Your obliged Servt. & friend
J. TORREY

SCHWEINITZ TO TORREY

BETHLEHEM, Sept 24th 1831

My dear Sir

By my nephew Mr. Eugene Freeauf who accompanied me on my late western tour, I take the liberty to send you a few specimens picked up under the disadvantages I labored under. The *Koeleria* & *Bromus* I should be very glad to have your opinion on. At the same time I forward to you my full list of all the plants I noticed on the tour, merely as I conceive it might interest you for a moment & beg you may return it to me—You will likewise find in the parcel the remarks which a renewed attentive study of your excellent Flora [89] as far as Triandria has suggested to me—which I beg you to accept & to make what use thereof you please or none at all. I have further put in a few hasty remarks on the

Plants known to me as naturalized in the U. S. Do you think a piece of the kind [73] would be useful & acceptable in Silliman's Journal? If you think it worth while I will communicate the continuation of my remarks on your Flora, as I proceed gradually in the study & comparison.

You cannot think how glad I should be to procure specimens of such of your plants as I have not seen. Such are to the end of Triandria *Blitum maritimum—Agrostis clandestina —Aira pumila—Panicum longifolium* & the true *Aira compressa.* Indeed if Mr. Freeauf could bring anything from you or Mr. Halsey on his return it would give me the greatest pleasure. My health is gradually mending, but I have not recovered my speech—so that I am unable to speak publicly. My friends leaving here a day sooner than was anticipated I am deprived of the fine opportunity of writing to you more at length. If you can without inconvenience show any attention to my nephew, who is not without scientific interest, I should be much obliged to you. Believe me most sincerely Yours

LEWIS D v SCHWEINITZ

TORREY TO SCHWEINITZ

NEW YORK, Sept. 29th 1831

My dear Sir,

On my return this afternoon, from Princeton, (where I have been spending a day or two) I found the parcel of plants & letter brought (& left also probably) by your nephew, Mr. Freeauf. Thinking it probable that he is still in town & that I shall find him tomorrow at Mr. Van Vleck's, I closed a parcel of plants which had been laid out for you nearly two weeks. This very small collection I hope will contain a few that have not yet found a place in your herbarium; but a number of the specimens are only sent for the purpose of being examined by you, & not in the expectation of their being such as are new or rare to you—

I thank you much for your "Remarks" on my Flora [89], & also for the list of plants found in your late journey. On your *Remarks*, I will take the liberty of sending you a few *observations*, if there should be time before Mr. F. (if he is still here) leaves the city; and I will also send a list, taken from your Catalogue, of such species as I desire particularly to possess.

Your kind letter of the 8th inst. is also still unanswered. It came rather too late for me to use the list of N. Am. Algae which you took the trouble to make out at my request, but it will be of use to me nevertheless, in preparing my general list of N. Am. plants wh[ich] I never lose sight of. I should be greatly pleased if I could have an opportunity of examining the salt water Algae of our Seacoast. It is astonishing that scarcely any of our botanists have collected them hitherto—no department of our Crytogamia has been so much neglected.

You remarked, that you had not seen the 2nd No. of Hooker's Boreal Flora [34]. It will give me pleasure to loan it to you for two or three months, after the first of November next—from which time, until the beginning of February I can give only occasional attendance to Botany. As you observe, this Flora would have been far more useful to you than the splendid work on the Ferns [37] sent you by Dr. Greville.

The contents of the parcel sent by your nephew are highly interesting to me. *Valeriana pauciflora* I almost despaired of ever seeing. Your *Koeleria* from Ohio seems to be very near one which Dr. Pitcher brought me from Fort Gratiot, a specimen of which I believe you have—

Your *Bromus occidentalis* I cannot distinguish from one of the varieties of *B. ciliatus* which grows in this neighborhood. After much exam^{n}. I am convinced that the *Bromus canadensis, ciliatus & pubescens* are all one species.

Hydrophyllum or *Phacelia*—This seems to belong to the former genus,—and near *H.* —— differing however in its denser clusters of flowers, & in being hairy. It is probably a new species.

Viola alba L.v.S. Is it distinct from *V. Muhlenbergii?* Perhaps the peculiarity of its appearance is owing to the situation in which it grew.

Salix—? I will not pretend to name any unusual species of this genus until I make a regular study of the collection which I have been making for several years, & which is now very extensive.

Sept. 30. I don't know that there were any other specimens in your parcel which required a particular examination—except perhaps a *Rumex*, which I think must be *R. verticil[latus]*: & the *Koeleria* which I now find is identical with a species sent to me

from West Chester by Dr. Darlington in 1827 & which I have called *K. subspicata.*

Oct. 1st. Your nephew called to-day & communicated to me the agreeable intelligence that he would not leave town until the middle of next week. I am much pleased with him, having found him exceedingly intelligent & communicative. *You*, my dear Sir, was the chief subject of our conversation. I was much gratified to learn that upon the whole your health had improved & I hope you will ultimately be restored to sound health—but above all it is my prayer that you may be submissive [to] our Heavenly Father, & be prepared for all his holy will—

Oct. 2nd. I have been occupied part of this day in separating a considerable collection of Alabama plants wh[ich] we have at length received from Dr. Gates.—As nearly every thing wh[ich] he transmitted was in the botanical way, it was necessary to divide the collection in to as many shares as the whole number subscribed for—making no less than 60—Three of these are yours, & they are already packed up, together with some specimens on my own account, your 3 mss. vols. on Fungi [76], & a volume which Mr. Halsey sent to me—

It is hardly necessary to mention, that the shares were assigned to the subscribers by *lot.* There are some very good things & several wh[ich] appear to be new. I am to make out a list of all those drawn by our friends here, of wh[ich] you may have a copy if you please; but I have made no remarks on those which are in your parcel as they are your property & you have a right to name & publish what you find new among them. You will find a most remarkable plant allied both to *Gerardia* & *Seymeria*, but quite a new genus,[*] first discovered the present year in *Georgia* by Capt. Le Conte. There is another collection to come from Dr. Gates, which shall be divided as soon as it arrives, & your share transmitted without delay—

Oct. 4th. I find that it will not be possible for me to send by the present opportunity my observations on your "Remarks", alluded to above—My ed^{n}. of Lindley [46] is just printed & you shall have a copy soon.

Very truly your friend & servt.

J. TORREY.

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* [*Macranthera;* see Ann. Lyc. N. Y. 4: 80, 81. 1837.]

TORREY TO SCHWEINITZ

NEW YORK, Feby 3rd, 1832.

My dear Sir,

Although I am excessively occupied with my College duties, & my head is crammed with chemical ideas, I often turn with a longing eye to my Herbm. & wish that I might again range the fields & climb the mountains in pursuit of my favorite productions of Nature—Not that I do not love my present employments—I *do* love them, & eagerly engage in all the duties of the laboratory—but Flora had my affections before I was acquainted with any of her sisters, & the first love, you know is the strongest. I begin however to see the end of my present course of lectures & after they are finished for the season, I hope to take up Botany in earnest.

Your favor of November last with your remarks on Gates's plants & a paper on naturalized plants [73] came to hand in due time.—The last was communicated to the Lyceum & referred to the Committee of publication. I have not time at present to reply to your obs[ervatio]ns on Gates's collection—but in the Spring (D.V.) I wish to communicate with you on the subject.

By Mr. Siedel I sent you my copy of Hooker's Fl. Bor-Amer. [34] except the plates of No. 1.—which I hope you recd. in safety.—I have now the 3rd. No. which is chiefly filled with the Leguminosae & it is at your service if you wish the use of it for three or four weeks—

Two or three days ago I was greatly delighted at receiving a box of books from Dr. Martius of Munich. Being occupied at the college, a friend transacted the Custom House business for me, & sent the box to my house—On opening it, it was found filled with parcels for yourself, the Lyceum & the Academy of Philadelphia—with only three volumes (a very coarse mutilated Copy of Travels in Brazil) [83] for your humble servant! Even these three books I am unable to read, as they are printed in the German language—but we have an English Translation of the two first vols. in the Lyceum. I am glad that there is something for you—but I wish the Dr. had sent me something for the $18.02, which I paid for freight, duties & other expenses on his "sending." How does it happen that transportation is so high in Germany? The

bill is nearly $6 for expenses to Hamburgh.—Dr. M. has sent the Acad. a fine Atlas & set of plates, intended to illustrate his & & Spix's Travels [83]—to the Lyceum he has presented a copy of his *Nov. Gen. & Sp—pl—Brazil.*—a beautiful & valuable work [51].

As your parcels were necessarily opened at the Custom house I took the liberty of *peeping* into one or two bundles of your plants, but they did not appear to be very interesting—there were many old German acquaintances among them, & I expect they are the scrapings of the Dr's. duplicate herbm.

In your last letter you held out to me the hope that I might reap some benefit from the revision of your Herb. which you expected to undertake the beginning of the present year. Allow me to remind you of my *list of wants* which I sent you some time since.

The parcels from Munich are left with Mr. Bininger, in Broadway, with the request that they may be forwarded to you by the first good opportunity.—

I have received nothing new since the winter commenced, except a *Splachnum* from Quaker Bridge which my friend Dr. Greene of Boston collected last spring. I inclose you a fragment of it—the Species wh[ich] it most resembles is *S. tenuifol[iu]m* of Hook. & Tay[lor]. Musc. Brit. ed. [——] [38] but it differs in some respects. I have not yet compared it with the specimens collected by Drummond in Arctic America.[*]

Have the Carvills forwarded you a copy of my edn. of Lindley [46]? One was left for you in their Charge more than a month since

Yours very truly
JOHN TORREY

SCHWEINITZ TO TORREY

BETHLEHEM, Feb 14th 1832

DR JOHN TORREY, New York
Dearest Sir

Your favor of the 3d instant gave me the most lively pleasure & not the least part thereof was caused by your declaration of constancy to your first scientific love. With all possible esteem

* [See footnote, p. 245.]

for her Sisters & their acknowledged beauties I confess I can hardly forgive any one's forsaking Flora's delightful service entirely, while I do most sincerely rejoice in the fact that a faithful attachment to her can & often does subsist, whilst her devotees are actively engaged in the more substantial employment of her richer sisters.

I look forward to your remarks on Gates' plants with no small desire—by the by—are we not to expect some fresh supply from that Gentleman. The last remittance tho' not extraordinary, was still extremely valuable.

The copy of Hooker's two first numbers [34], which you so kindly lent me, was duly received & has been assiduously studied by me. I regret (besides the want of the plates of the first no.) that I suffered myself to be deterred from my first intention of copying out the whole (for since then I have copied a much longer & less useful affair) until the time you have so kindly allowed me for the use of it has expired: I am however very glad to be able to prove to you my punctuality in returning by the good opportunity which offers to send it you. Tomorrow a gentleman with whom I have become scientifically acquainted during his winter's residence here, viz. Dr. Saynish of Nyk [New York] proposes to go to Nyk & has promised me to take charge thereof. He will make a stay of a few days only—if you can spare it—I should most eagerly embrace your offer of perusing the third No.—provided you could send it to me by that Gentleman—& would do my best to return it shortly to you. I have not received the Copy of your edition of Lindley [46]—tho' most eagerly looked for. Indeed I have deferred a study of the natural families for which I had prepared myself—until after its receipt as it will doubtless aid me essentially. Dr. Saynish has promised me to call at Carvill's & try to get the volume. I have actually gone thro' my collection as I stated to you in a former letter—but I found the project of combining a selection of your desiderata with the object I principally had in view not so practicable as I thought, & have therefore resolved to make that selection the cause of a new progress thro' the whole. The list of your desiderata however appears to me to be taken exclusively from my list of plants *obiter* observed during my western journey only. On this account I am about making out

for you a new list of all my American plants, in which however I mark those of which I cannot spare any, for want of a duplicate. I shall send you this & beg you to mark such of the rest as you would be desirous to see & have at all events.

Your annunciation of the arrival of packages for me from Dr. Martius, was wholly unexpected. I can very deeply sympathise with you on the disappointment the contents of the box caused you—from similar misfortunes which I have experienced—& am much obliged to you, that you have probably saved me one, by your peep into my parcels—for I should certainly have expected something more valuable than I fear the scrapings of Dr M.'s Herb. may prove, altho' Dr. Saynish tells me, that he has seen the whole of Martius' Brazilian collection, & that they are upon the whole extremely imperfect & wretchedly preserved. However every little helps.

My friend Mr. Bininger has just informed me that he is about forwarding these packages to me very soon. Pray, my dear Sir, let me bear my proportion of the truly enormous charge upon the box & inform me of what that amounts to.—It can only be owing to mismanagement that the German transportation comes so high—or perhaps to that spectral ghost the Cholera which has possessed the European governments & makes them do everything in their power to prevent the passage of packages of every kind. I have lately received Journals, which were perforated in every direction (as all my letters regularly are) by the purifying chisel & so imbued with a smell of Vinegar of Four Thieves, that I can hardly stand the perusal of them.

The little *Splachnum* appears to me very interesting. Be sure to inform me whether it agrees with your arctic specimens of Drummond. By the by, has that gentleman actually commenced his operations in this country—& is there any hope of participating in the harvest?

The entire restoration of my health (tho' alas not of my youthful energy in climbing fences & stooping & marching, the want of which will be a great drawback on my exertions) with which I flatter myself, gives me hopes of doing more this year in Botany than of late years. I have not heard from Mr. Halsey for a long time—& will beg to remind you once more to be so kind as to let

me know—if you do—where Capt. Le Conte may at present be found. If in any vacation of your duties you could make it possible to stay some weeks, days or even hours only at my house—it would give me the sincerest pleasure.

I remain yours most sincerely
LEWIS D v SCHWEINITZ

P.S. I have two packages of plants for England lying ready for more than a year—but have not yet been able to devise a way of forwarding them to London with safety—as I am told Capts. of Packets refuse to take charge of such things. How do you manage these matters?

TORREY TO SCHWEINITZ

NEW YORK, Feby. 29th 1832—

My dear Sir,

I was quite vexed with myself when I called at Dr. Johnson's to see Dr. Saynish, to find that he had just left the city for Bethlehem. I had something for you which I intended to have left with him on Monday even[in]g last, but, a severe indisposition confined me to the house. It was my impression that Dr. S. was to remain some days more in town—or I should certainly have strained matters to have made him a call. My mind was so occupied with College & Chemistry that I postponed the business a few days, when I knew I should be at leisure. I shall call shortly at Mr. Bininger's, or Mr. Van Vleck's to enquire about another opportunity for your town—

The 3rd. No. of Hooker [34] is quite at your service for a month if you wish it,—but next Autumn you may have it again—until March 1833! I understood from a former letter, that you had the 1st. No. of this work, or I should have sent the plates of it with the others but it seems you wish to see them. They shall be forwarded by the next opportunity. I will also send you the 1st edn. of No. 1. which scarcely differs from the 2nd ed. except in being printed on smaller paper. If it is of any use to you, I beg you will keep it. I know not why the copy of Lindley's Introduction [46], which I prepared for you so long since, has not reached you. It was directed to be sent to Mr. Bininger's store. Perhaps Dr. S. obtained it from the Carvills, if it still remained in their hands.

I hope, my dear Sir, that you will soon be able to look over your collection for the purpose of selecting for me, according to your kind offer. When your list of duplicates arrives I shall immediately forward you a list of the species which are still desiderata with me—

You doubtless received the parcels from Dr. Martius in good time. I hope you found something in them worth your acceptance. —The books, of course are valuable—But the plants, from the hasty glance which I took of them, seemed to be rather indifferent. You are right respecting the cause of the expense of transportation in Germany—Mr. Cuthbert, the American Consul at Hamburgh, informed me in a letter that the box was subjected to numerous detentions at the various quarantines established for the Cholera. You need not trouble yourself about the charges on your portion of the box, for they only amount to about $2.50, which is less than you must have paid on some of the parcels transmitted to me—

I have looked over Drummond's Arctic Mosses since I wrote last, & my impression is that the *Splachnum* of Quaker Bridge is quite distinct from the *S. angustatum*. It will probably turn out to be a new spec. We have all neglected botany this winter in New York. but as the spring will be here tomorrow I hope we shall have our feelings enlivened, & resume the study of plants with renewed zeal.

The address of Capt. Le Conte at present I cannot give you without some doubt. It is probable that he is residing with his brother Lewis LeC. in Riceborough, Liberty County, Georgia. A letter sent there, intrusted to his brother's care will no doubt reach him soon.

If you will send your parcels for England, to New York, & direct them to Mr. Bininger's Store, I will have them forwarded to London by the next packet. If the Capts. are waited on personally, they will take charge of small bundles. We have a young merchant in our family who cheerfully does all such business for me.

By the next private opportunity I hope to write you more at large. Your obliged & faithful friend

JOHN TORREY

SCHWEINITZ TO TORREY

BETHLEHEM March 29th 1832

My dear Sir

Your exceedingly agreeable communication of the 29th ult. ought to have been answered long ago—& would—but for a new & severe attack of my complaint—owing, I have reason to fear, in a great measure to the failure of Spring coming on, & that unheard of severe weather which has with us kept alternating with warmth. I trust the worst is over & have found considerable relief from my complaint for a few days past—so that I can again breathe with some freedon.

How much I deplore that you were prevented from forwarding what you intended for me—pray leave anything of the kind at Mr. Van Vleck's or Bininger's—& it will reach me. As regards the 3d number of Hooker [34] as it is now too late to request its perusal for the present, I shall be much obliged to you to send it in autumn so that I may have it during next winter, begging by all means, if you can spare it, to add the 1st Ed. of No. 1 which you so kindly offer.

But I can hardly adequately express to you the gratification & instruction, which the Copy of your Ed. of Lindley's Introd[uction] [46] (which Dr. Saynish bro't me) imparted to me. I fairly devoured it—& think the work truly excellent. For the first time I have thereby been enabled to acquire an insight into the natural System & was delighted by it.

For some time I have been busily engaged in making out a list of the duplicates I can make out of my collection for you. But it is a work of some considerable magnitude. Tho' I do not precisely know whether you wish me to include European plants,—I have added a list of all, of which I can afford specimens, except such as are very common. Their number greatly exceeds that of the American duplicates I can offer you—as I naturally exclude from my list of these the numerous ones, which I know you are familiar with—or which I owe to your kindness.

The parcels from Dr. Martius—tho' they did not furnish to me more than about 40 species new to my collection, where [were] nevertheless valuable because in many instances they contained better specimens than I had before. He holds out a promise of

sending Brazilian plants—when his work on them shall be finished. The few specimens however which he has sent are exceedingly imperfect. A better addition to my collect[ion] was made about the same time by about 300 Cape plants which cost me 5$ & were procured thro' Dr. Saynish.

I am much obliged to you for your directions as to Capt. Le Conte. Just before I received y[ou]r k[in]d letter an opportunity offered for forwarding my two packets of plants to England—which I embraced—but have since much regretted it—for I have learnt such particulars about the person, who took charge of them, that I am not without fears about their safe arrival.

One thing considerably cheers my mind—it appears to me, that the very particular affection of my lower extremities, which has so much impeded me for a year or two past—is wearing off—& I begin to think that if this was overcome all my other complaints of the chest &c. might possibly give way likewise. No kind of occupation gives me greater relief than botany.

Believe me my dear Sir your very obliged & faithful friend

LEWIS D v SCHWEINITZ

P.S. If I have correctly understood your former letter you stated that the Copy you received of Dr. Martius travels (83) was incomplete. It was not, till a few days ago, when about to send my copy to be bound—that I discovered—that the second volume is double with me. Should this be the part wanting in yours—pray let me know, that I may sent it to you.

SCHWEINITZ TO TORREY

BETHLEHEM, April 12th, 1832.

My dear Sir

I am well aware, that in forwarding to you the inclosed long promised lists 1) of American 2) of European plants, of which on a strict examination of my collection I can furnish you with a specimen—I am imposing no slight task on your eyes—by the microscopic & perhaps illegible characters in which it is written. I was induced to press the whole together in so small a space in order to be able to forward it to you by a mail at an early day, to enable you to take time to mark all those which you desire to have—because you will readily conceive that it will require considerable

time for me to get them out for you. But, if they or any of them shall be acceptable to you—I can promise every one here noted & desired by you—unless I have inadvertently in any case made a mistake. In the labels which I shall give those you wish—I will carefully note the place & the source from which I have derived them.

In the first list—all the underlined species are such as *I* have named & there are not a few among them, whom probably you will not be able to admit as new species. Nevertheless I was desirous of letting you see what I have so designated, subject to future correction—Probably I may have likewise mistaken others. In every case your opinion & remarks will be truly acceptable. I presume there are not a few—which I have heretofore sent you. All such—& indeed in general all that you do not absolutely want—I shall be glad to keep—as I have been very strict in naming in the list *every* species—of which I can at all afford a tolerable specimen. The same is the case, tho' not so generally, as regards the European List. In the American all those which I owe to your kindness & all those which I know to be common & in your collection are left out—which has greatly reduced the number. In the European list very common species are likewise omitted. Having been disappointed in my hopes of cramming the whole second List on one sheet—I was tempted to fill up the blank part of the new one I had to take by a list of my American desiderata, arranged according to the authors from which they are derived, leaving out in each succeeding author's list all those already recited in the preceding ones. I need not say that if you can provide any of these—or other new things—how much I shall be obliged to you—for it is dreadful how large a number is still wanting. I only beg to add that the European plants are chiefly good specimens, perhaps to be sure mostly known to you. But you will at least see my willingness & desire to contribute what is in my power. My tropic plants rarely afford duplicates—except the Surinam of which I have already sent all I had.

I wonder whether you have seen that most extraordinary & impertinent publication which Rafinesque has just issued—on every possible subject, under the title of Atlantic Journal [63]. He is doubtless a man of immense knowledge—as badly digested as

may be & crack-brained I am sure. His short reviews of 23 recent works—among which your ed. of Lindley [46] is likewise paraded—are truly comical. I have some notion of competing for the splendid prize of Twenty-five Dollars he offers, to be paid Nota bene—in pamphlets of his own manufacture & specimens of plants from the same laboratory—for the best synopsis of U. S. Phaenog. plants—under the highly characteristic condition—that not a single one already described or published in Europe & Am.—(meaning by himself) shall be omitted. Do pardon me, dear Sir, for the impertinence of sending you these enormous lists & believe me most sincerely Yours

LEWIS D v SCHWEINITZ

P.S. I am happy to say that by the Lord's mercy I am almost entirely recovered in my health—& do not doubt that Spring, if it come at all—will complete my entire restoration.

SCHWEINITZ TO TORREY

BETHLEHEM May 17th 1832

My dear Sir

Some weeks ago I took the liberty to trouble you with a very voluminous list of my duplicates—together with a letter—which I trust came safe to hand. I did not expect an answer immediately as I am aware your time is so much engaged—but had requested a friend who since has gone to New York to give you a call & to learn whether it has reached you. He however forgot to fulfill his promise. I therefore now write to you in order to say, that about the 12th of June, Deo volente, I hope to be in New York for a few days & should be very much obliged to you, if you would kindly by that time leave a line at Rev. W. Henry Van Vleck's, No. 14 Dutch Street, informing me of the time & number where I could conveniently to you, call upon you. My duties will call me to divers places at a distance from New York—so that I should be extremely glad to be able to arrange an interview before hand.

You will learn with satisfaction, I am sure, that it has pleased the Lord perfectly to restore my health excepting only a stiffness in the lower extremities which greatly impedes me in walking—but which I shall probably never get over, as I begin to con-

sider it either the forerunner or the lieutenant of an hereditary affection of the gout. Botanical exertions out of doors are greatly impeded by it—while experience teaches me notwithstanding that they are the best alleviations of the evil.

Excuse my troubling you with this short letter & believe me with sincere regards yours affectionately

L D v SCHWEINITZ

TORREY TO SCHWEINITZ

NEW YORK, May 19th 1832

My dear Sir

I received your letter of the 17th, this morning, & that of the 12th ult. (containing the elaborate catalogues which made me feel how indolent I am), came also in good time. Indeed, on looking over my file, I have just discovered that even a third favour remains unanswered! Your second came soon after the preceding one, & I was making preparation to answer it, when I received yours of the 17th. I have nearly completed marking in your list of North American, those species which I should like to possess. I am ashamed that so many of them are still wanting in my herbarium. Many are marked because I have bad or doubtful specimens under their names. Still more ashamed am I, that I can do so little for all the trouble I occasion you. Of that long catalogue, embracing the N. Am. plants which you wish to obtain, scarcely any are among my duplicates. I shall however, preserve the list & give you the first choice of what falls into my hands—& I sincerely hope that some of the many nets which I have spread, will gather for me what will not only replenish my own herbm. but enable me to assist materially my friends. The list of European plants I cannot compare with my herb. till I return from Princeton. It requires more time for me to make the examination in consequence of my collection being arranged according to the Natural Method, while your catalogues correspond with the Linnaean System.

It affords me sincere pleasure that I may indulge the hope of meeting you next month. It is true I have an engagement at Princeton during June & July, but I expect to leave my family in New York, & to visit them nearly every week. I am not occupied

on Saturdays & Mondays, & conclude my lecture on Friday in time to reach New York the same day to tea—so that if you could manage to meet me on some Friday evening, Saturday, or Monday before 12 o'clock—or on all of those days,—or what is much better, make my house your home during one of my visits in June, I shall (D.V.) be able to enjoy your company. The only difficulty which I perceive, is, that the 12 of June will occur of Tuesday. Perhaps, however, a day or two before or after this date will not materially interfere with your arrangements.

The 2nd vol. of Dr. Martius' & Spix's travels [83], I have learned, through Dr. DeKay, belongs to the Lyceum of Nat. History, whose set is defective that volume—There were three sets in the box, & I made the blunder in dividing them for their several owners, so that we will thank you to forward it by the first good opportunity.—Perhaps you can bring it on yourself in June next.

I must trouble you with one more subject before I close my letter. Two or three years ago—perhaps longer—Dr. Greville informed me that he placed in the hands of a Mr. Davidge, who said that he was about leaving Scotland, for America, a copy of his Algae Britannicae [26]—but the work never came to hand. I have written to Dr. G. several times on the subject, but he says that he can obtain but little accurate information about the gentleman who took charge of the package—tho' he ascertained that he did eventually embark for this country. Dr. G. says that by the same person, he sent to my care a set of impressions of *Icones Filicum* [37] as well as a letter *for you.* I have some recollection of receiving for you the plates alluded to—but accompanying them there was nothing for me that I observed. Did you get the plates—& also any numbers of the *Algae*? If I did not forward you the parcel perhaps you received it from some other quarter—& perhaps also you can tell me something about this Mr. Davidge that I may write to him & get my copy if he yet has it.

Hoping to see you completely restored to health in the course of a few weeks. I remain My Dear Sir, Yours faithfully

JOHN TORREY

Please return the inclosed list when you have done with it.

SCHWEINITZ TO TORREY

BETHLEHEM May 24th 1832

My dear Sir

I was not a little delighted yesterday by your letter of the 19th ult. (unable as I am to account for the circumstance that almost all letters I receive from New York, whence the mail arrives daily & goes thro' in 1 day & night—are four days old) & for fear you may go to Princeton too soon I hasten to answer it. I greatly deplore that it will be impossible for me to arrive at New York before the 12th of June (being Tuesday) which will deprive me of the pleasure of meeting you that week—with a certain prospect that on Saturday & Monday following, which days are those I could otherwise hope for that desirable event, I shall be absent from New York in the prosecution of my duties. It is however possible that I may be able to prolong my stay until the 23d of June, before I leave the city altogether—and perhaps circumstances may occur to detain you in town on the 13th or 14th when I shall doubtless be there. At all events please to leave a card for me at Mr. Van Vleck's No. 14 *Dutch* Street—with your address designating the number & street—& likewise that of Mr. Halsey if you conveniently can. I shall certainly bring the odd volume of Dr. Martius [83] with me to New York & deliver it to Dr. DeKay.

In answer to your enquiries concerning the Algae Brit. of Mr. Greville [26] which you have not received—I can only say, that nothing of that kind has come to my hands & that I think you must be under a mistake as to the time they were sent (2 or three years ago or perhaps longer) if at all connected with Dr. Greville's set of impressions of Icones Filicum [37], which I certainly received thro' your kindness. By recurring to your letters, I find that on the latter subject you wrote to me under date of *May 14th 1831*—that the parcel for me cont[aining] the Icones had a few days before been left at your house by an unknown person—& that you had placed it in the hands of Mr. Thorburn to be forwarded to me—which was accordingly done & I received it shortly after my return from Indiana. Dr. Greville's letter to me had come to hand some time before per mail, & ship-marked—so that it does not seem to have been brought by a friend—tho' so stated

in the letter, without however naming him. I am truly glad to see by your returned list—that I shall be able to furnish you so large a number of plants—but you will no doubt allow me time to go thro' my collection at leisure to make out the parcel,—which will be impossible I fear till after my return from New York.

Dr. Pickering has just informed me that my Synopsis of American Fungi [76]—is very nearly printed. I trust by the time I get to Philad. on my return, it will be entirely so—& that I shall be sure of getting a number of copies presented to me by the Philosoph. Soc. But if they allow me but two copies—one is yours & shall be forwarded as soon as procured.

I am just attempting a negotiation with Collins' administrator at getting from him some of the loose packages of plants—if it can be done without extravagantly paying for them—for the price which I understand is asked for his own collect[ion] of American plants—is exorbitant & at all events greatly exceeding my means. The less I am able to exert myself by collecting plants from nature —the greater my zeal becomes of increasing my collection (which with Cryptog.—is now nearly 20,000) of dried specimens. Two packages from Wallich I have been informed are on the way for me.

With the most ardent wish of not being disappointed in meeting you personally, I remain Yours affectionately

LEWIS D v SCHWEINITZ

TORREY TO SCHWEINITZ

NEW YORK, June 18th 1832.

My dear Sir,

Your letter of the 24th ult. I received in due time. I entertain some hope that I shall meet you on my next visit to this city, which will be on the 22nd inst. if the Lord prospers me. I do not see how I could break off from Princeton earlier in the week than Friday morning, after my lecture, & by taking the New Brunswick stage at 10 A.M. I can reach New York by 6 P.M. If you can possibly remain until the time stated, it would afford me great pleasure to talk over with you a variety of matters, which cannot well be discussed in letters. If you must pass on without seeing me, I certainly must endeavour to make you a visit some time in August or September next.

I made a sad mistake respecting the time when I received the Ferns [37] for you from Dr. Greville. Even now I barely recollect that I left a parcel for you at Grant Thorburn's seed Store. No tidings have yet been received from the gentleman into whose hands Dr. G. placed also a copy of his *Algae Britannicae* [26] for me.

I leave for you the 1st Part of Hooker's Boreal Flora [34] (without the plates) which I hope may prove of some use to you. The 4th No. is out in England, but I have not received it yet.

You have perhaps heard of the lamented death of DeCandolle! The news[*] reached me just at the moment that I closed for him a parcel of rare plants. To our short-sighted vision it appears to be a misfortune that he did not live to finish his great work, but we must submit—the Judge of all the earth always does that which is right.

Our citizens are much alarmed at the prospects of cholera reaching us ere long. Indeed there is too much reason for believing that our fears will be realized, but I trust & pray that in the midst of wrath, God will remember me mercifully.

In haste I subscribe myself
Your faithful friend
JOHN TORREY

TORREY TO SCHWEINITZ

NEW YORK, October 22nd 1832

My dear Sir,

Your letter of the 30th of August last, together with the two copies of your work on the Fungi [76], reached me safely & in good time. The copy for Mr. Halsey was sent to him forthwith. I congratulate you on the completion of this great performance. Its appearance will be hailed by all the lovers of Cryptogamic botany, here & elsewhere. If we now had the other departments of our ACOTYLEDONES finished, we [would] have our entire Flora *posted up* to the present day. When shall we have our Lichenes, our Musci, our Algae & our Hepaticae? Life is too short—too valuable, I ought to have said, for any *one* of us to undertake the whole. We must secure the great object of present existence, whatever else we surrender or neglect.

* [This "news" was erroneous.]

The dreadful Cholera has now almost entirely left us, & not not one of my family has been touched—or rather none has been smitten down, for several of us have had mild attacks of the disease. Not even any of my relatives or near friends have been removed, though hundreds have fallen around us. Surely it has not been on account of our righteousness that we have been spared. It is God, that has preserved us, in his inscrutable sovereignty.

I regret to hear, my dear Sir, that your health has not been established—that on the contrary, you grow more feeble. I pray that you may be patient & resigned, & that all your afflictions may be turned to the profit of your soul, by him who says that "affliction cometh not forth of THE DUST."

A few days ago I received a large collection of plants from the Arkansas country,—embracing about 300 species. Many of them are exceedingly curious and interesting—& not a few of them quite new. I have a few duplicates of the rarer species, which I will send to you by an early opportunity. Some of the plants had been collected by Nuttall, in 1819 & 1820. These have mostly been described & sent to De Candolle for publication. Who is to continue De Candolle's Prodromus [16]? I suppose you have heard of the death of this great man. The 5th vol. embracing the Compositae, must have been completed before his death.

Last week my wife & eldest daughter embarked for Europe. They are to spend the winter with our relations in Ireland, & I hope, with leave of Providence, to join them early in the spring. It is my intention to take over as many of our doubtful plants as possible & compare them with the original specimens in the herbaria of Pursh, Hooker, Michaux, & others who have written on our Botany. If you have any plants which you should like to have compared, I hope you will send them to me in the course of the winter.

Excuse this short & uninteresting letter, & believe me, my dear Sir,

Truly & affectionately yours

JOHN TORREY

REVD. L. DE SCHWEINITZ

TORREY TO SCHWEINITZ

NEW YORK, August 24th 1833

My dear Sir.

By the blessing of God I have safely returned to my native land, & to my happy home, after being so long separated from them. Although I am by no means fairly settled yet, I must address you a few lines, to enquire about your health & also to inform you that a parcel from Dr. Hooker will immediately be sent, for you, to the store of Mr. Bininger, in Broadway. The said parcel was placed in a box at Glasgow last April, & forwarded to New York, but my family misunderstood my directions, & did not leave it, as addressed, or you would have received it long since.

I have had a pleasant time of it in Europe, though my stay was too short to accomplish all that I desired to do. I spent more than a month in Dr. Hooker's family, from whom I received every possible kindness. Dr. H. is a delightful man, & one of the most liberal botanists in the world—I was positively ashamed to take so many plants & books from him without the possibility of my making any suitable return. At Kinross I spent a week with Dr. Arnott, who is a most accurate botanist. He is working, along with Dr. Wight, at a Flora of Peninsular India [94]. In Edinburgh I made the acquaintance of the excellent Prof. Graham—

In London I went through Pursh's Herbm. in Mr Lambert's possession, & also Gronovius' plants in the British Museum. I was much pleased with Mr. Brown who is an astonishing man. We became quite intimate, & he is to furnish me with some remarks on several interesting American plants. I saw much of Lindley, Bentham, &c.

In Paris I worked hard at [the] Michaux Herbm., preserved at the Garden of Plants, & have settled many doubts which have hung over his plants.

You must write to me as soon as convenient & let me know what is the state of your health, & what you have been doing in the botanical way since I have been absent. I am sorry that I cannot write to you at greater length at present.

Believe me, My Dear Sir

Yours very truly,

JOHN TORREY

TORREY TO SCHWEINITZ

NEW YORK, November 2nd 1833

My Dear Sir

If you were to judge from my great delay in replying to your letters that I valued your correspondence but little I could hardly blame you very much, were you unacquainted with the fact that I am occupied in many concerns besides botany. But you know that I have my hands full of business, & that if I am not so prompt a correspondent as some others, it is not always my fault. Since I received your kind letter of the 2nd of September last I have attended as much to plants as possible & have not forgotten you when any duplicates came in my way.—But I will first reply to your letter before I make any remarks on other matters. I am much pleased to hear of your improved health, & hope that you will not soon be so dreadfully afflicted as you were for some time before I left this country for Europe. You must have suffered much if you are willing to compound for Gout! The parcel which Dr. Hooker consigned to my care no doubt reached you safely, & I know that the contents pleased you much. I was present when the specimens were selected for you by our excellent friend,—Mrs. H. wrote your labels, while the Dr. called out the names.—The parcel left at Mr. Van Vleck's on the 6th of December last (I keep an exact record of all my *doings* in this way) contained your shares of Gates' last plants (some very good things) & some duplicates of Dr. Pitcher's collections on the Arkansas & Red Rivers. You may yet find the parcel—for on my return from Europe I received my long expected copy of Dr. Greville's *Algae britan.* [26] which was between two & three years on its way to me.

I rejoice in your acquisition of Dr. Baldwin's plants, though you may suspect that my joy is not without some selfish feeling,—for you generously offer me a share of your duplicates. By this time you must have completed the examination of your treasures, & have learned the value of them. The Georgia & Florida specimens that you may have to spare I shall be most happy to receive. As soon as your list is complete I hope you will allow me to have it by an early opportunity, or by mail, & I will then mark such as are desiderata with me. In distributing your duplicates I hope you will be able to send a few to our friend Dr. Hooker—

especially of the S. American species.—Have you any of the Surinam plants left, that you could spare him? He is much interested in S. American Botany. Rafinesque's proposal for the Duplicates of Baldwin's collection was a strange one! You of course declined it.

Did I tell you that I had made an engagement with Dr. Gray (of Utica), to aid me in my botanical & chemical labours? He lives in my house, & is now working daily at my herbarium. My whole collection will soon be arranged according to the Natural method, & in the spring (D.V.) I shall attack with zeal, my Flora Synopsis of North American plants [92]. Dr. G. will devote part of his time to his own concerns (according to our agreement), & has made arrangements for publishing collections of dried plants of the more difficult genera & families:—such as Gramineae, Cyperaceae, Aster, Musci, &c. He hopes to publish the 1st No. of his N. Am. grasses in the Spring & the 1st No. of his N. Amer. Mosses about the same time. The price will be $5. for 100 sp. neatly fastened on white paper, with printed title page, index & labels—with a handsome portfolio. The specimens placed loose [on] herbarium papers, with printed labels—but without the portfolios will be sold at $4 pr. 100.—When you write to your German friends please give them this information & cause it to be printed in some botanical periodical or magazine in Germany. Dr. Gray will spend a month or two every season in collecting specimens from the most interesting localities that are not too remote.

Have you seen the 6th edn. of Eaton's Manual of Botany [20]? I have not examined it—nor indeed have I scarcely seen more than the covers of the book. I began to read the preface in a bookstore the other day, & it seemed to be a most remarkable performance,—but I was interrupted before I had finished the first page. Dr. Lewis Beck's new Work [7] is a pretty good compilation—but it does not settle many of our difficult plants.

Have you the 6th No. of Hooker's Fl. Bor. Amer. [34]? It goes partly through the Compositae. The Dr. hoped to have completed the 1st. Vol with the 6th No. but he finds it necessary to add a 7th No. The whole work (excluding all the Crypts. but the ferns) will make two volumes of 13 numbers.—It is a charming

performance.—The amiable author was uncommonly kind to me when I was in Glasgow, & compelled me to stay a month with him. He is a most industrious man—for besides the Northern Flora, he is writing (with the aid of Mr. Arnott) an account of Capt. Beechey's plants [36]—he prepares every month, a number of Curtis' magazine [18]—he has lately published three volumes of the Bot. Miscellany [10], & has a new number ready to publish.—besides many other works—so that I cannot conceive how he can do so *much* & do it *so* well. I have no botanical news to give you, of much consequence. My friend Dr. Barratt spent several days of this week with me. He has been studying our Willows for two years past, & has made many valuable obs. on these obscure plants. I will urge him to send you a set named by himself.

Your obliged & faithful friend
JOHN TORREY

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Anleitung die im mittleren und nördlichen Deutschland wachsenden Pflanzen auf eine leichte und sichere Weise durch eigne Untersuchung zu bestimmen. Görlitz. 1823.

18. Curtis's botanical magazine, comprising the plants of the Royal gardens of Kew and of other establishments of Great Britain, with suitable descriptions. Established in 1787 by William Curtis.

19. **Dewey, Chester.**
Caricography. [Consisting of a long series of articles appearing in] Am. Jour. Sci. vols. **7–42**. 1824–1866. [Index to species in vol. **42**, pages 325–334.]

20. **Eaton, Amos.**
A manual of botany, for the northern and middle states of America. Third edition. Albany. 1822. Sixth edition. 1833.

21. **Ehrenberg, Christian Gottfried.**
Fungorum nova genera tria. Jahrb. Gewächsk. 1^2: 51–58. 1819.

22. **Elliott, Stephen.**
A sketch of the botany of South-Carolina and Georgia. Charleston, South Carolina. 1818–24. [See Barnhart, J. H. Dates of Elliott's Sketch. Bull. Torrey Club **28**: 680–688. D 1901.]

23. **Fries, Elias Magnus.**
Systema mycologicum, sistens fungorum ordines, genera et species, huc usque cognitas, quas ad normam, methodi naturalis determinavit, disposuit atque descripsit Elias Fries. Lund. 1821–30.

24. ——
Systema orbis vegetabilis. Primas lineas novae constructionis periclitatur Elias Fries. Pars I. Plantae homonemeae. Lund. 1825.

25. **Gray, Asa.**
John Torrey. Proc. Am. Acad. Arts & Sci. 9: 262–271. 1874. [Also published in Am. Jour. Sci. III. 5: 411–421. 1873; and in Scientific papers of Asa Gray 2: 359–369. 1889.]

26. **Greville, Robert Kaye.**
Algae britannicae, or Descriptions of the marine and other inarticulated plants of the British Islands, belonging to the order Algae. Edinburgh, 1830.

27. ——
Flora edinensis: or, A description of plants growing near Edinburgh, arranged according to the Linnean system. Edinburgh. 1824.

28. ——
Scottish cryptogamic flora or coloured figures and descriptions of cryptogamic plants, belonging chiefly to the order fungi. Edinburgh. 1823–28.

29. **Hedwig, Johann.**
Species muscorum frondosorum descriptae et tabulis aeneis LXXVII coloratis illustratae. Opus posthumum, editum a Friderico Schwaegrichen. Leipzig, Paris. 1801. [See also no. 66.]

30. **Hitchcock, Edward.**
Description of a new species of *Botrychium*; with a drawing. Am. Jour. Sci. 6: 103–104. 1823.

31. **Hoffmann, Georg Franz.**
Deutschlands Flora oder Botanisches Taschenbuch. Zweyter Theil für das Jahr 1795. Cryptogamie. Erlangen. [1795.]

32. **Hooker, William Jackson.**
The British flora. London. 1830. Ed. 2, with additions and corrections. London. 1831.

33. ——
British Jungermanniae: being a history and description, with colored figures, of each species of the genus, and microscopical analyses of the parts. London. 1816.

34. ——
Flora boreali-americana; or, The botany of the northern parts of British America: compiled principally from the plants col-

lected by Dr. Richardson & Mr. Drummond on the late northern expeditions, under command of Captain Sir John Franklin, R. N. To which are added (by permission of the Horticultural Society of London), those of Mr. Douglas, from north-west America, and of other naturalists. London. 1829–1840.

35. ——
Musci exotici; containing figures and descriptions of new or little known foreign mosses and other cryptogamic subjects. London. 1818–20.

36. **Hooker, William Jackson, & Arnott, George Arnott Walker.**
The botany of Captain Beechey's voyage. London. 18[30–]41.

37. **Hooker, William Jackson, & Greville, Robert Kaye.**
Icones filicum ad eas potissimum species illustrandes destinatae, quae hactenus, vel in herbariis delituerunt prorsus incognitae, vel saltem nondum per icones botanicis innotuerunt. London. 1831.

38. **Hooker, William Jackson, & Taylor, Thomas.**
Muscologia britannica. London. 1827.

39. **Humboldt, Alexander, & Bonpland, Aimé Jacques Alexandre.**
Plantae equinoctiales. Paris. [1805–17.]

40. Jahrbücher der Gewächskunde. 1818–20. Berlin & Leipzig. Edited by K. Sprengel, A. H. Schrader, and H. F. Link.

41. **Keating, William Hypolitus.**
Narrative of an expedition to the source of St. Peter's River, Lake Winnepeek, Lake of the Woods, &c. &c. performed in the year 1823, by order of the Hon. J. C. Calhoun, secretary of war, under the command of Stephen H. Long, major, U. S. T. E. Comp. from the notes of Major Long, Messrs. Say, Keating, and Colhoun, by William H. Keating. Philadelphia. 1824.

42. **Lagasca, Mariano.**
Genera et species plantarum, quae aut novae sunt, aut nondum recte cognoscuntur. Madrid. 1816.

43. **Le Conte, John Eatton.**
Observations on the North American species of the genus *Utricularia*. Ann. Lyceum Nat. Hist. N. Y. 1: 72–79. 1824.

44. ——
Observations on the North American species of the genus *Viola*. Ann. Lyceum Nat. Hist. N. Y. 2: 135–153. 1826.

45. **Lindley, John.**
An introduction to the natural system of botany. London. 1830.

46. ——
An introduction to the natural system of botany . . . 1st American edition with an appendix. By John Torrey. New York. 1831.

47. ——
A synopsis of the British flora. London. 1829.

48. **Linné, Carl von.**
. . . Systema vegetabilium. Editio nova, speciebue inde ab editione XV, detectis aucta et locupletata. Curantibus Joanne Jacobo Roemer . . . et Jos. Augusto Schultes. Stuttgart. 1817–30.

49. **Loudon, John Claudius, ed.**
An encyclopaedia of plants. London. 1829.

50. Magazine of natural history . . . Editors: 1829–36, J. C. Loudon and John Denson; 1837–40, Edward Charlesworth. Merged into the Annals of natural history, which continued as the Annals and magazine of natural history.

51. **Martius, Karl Friedrich Philipp von.**
Nova genera et species plantarum. Munich. 1823–32.

52. **Muhlenberg, Gotthilf Henry Ernest.**
Catalogus plantarum Americae septentrionale, huc usque cognitarum indigenarum et cicurum. Lancaster. 1813. Ed. 2. Philadelphia. 1818.

53. **Nees von Esenbeck, Christian Gottfried Daniel.**
Das System der Pilze und Schwämme. Würzburg. 1816–17.

54. **Nuttall, Thomas.**
Collections towards a flora of the territory of Arkansas. Trans. Am. Phil. Soc. 5: 139–203. 1837.

55. ——
Genera of North American plants. Philadelphia. 1818.

56. ——
A journal of travels into the Arkansa Territory, during the year 1819. Philadelphia. 1821.

57. **Palisot de Beauvois, Ambroise Marie François Joseph.**
Muscologie, ou Traité sur les mousses. Mém. Soc. Linn. Paris 1: 388–472. 1822.

58. ——
Prodrome des cinquième et sixième familles de l'æthéogamie. Les mousses. Les lycopodes. Paris. 1805.

59. **Persoon, Christiaan Hendrik.**
Synopsis methodica fungorum. Göttingen. 1801.

Philadelphia academy of natural sciences. Journal. Established in 1817.

Pursh, Frederick Traugott.

Flora Americae Septentrionalis. London. 1814.

Quarterly journal of science, literature, and art. Edited at the Royal institution of Great Britain, by W. T. Brande.

Rafinesque, Constantine Samuel.

Atlantic journal and friend of knowledge. Philadelphia. 1832–33.

Richardson, John.

Botanical appendix. In Franklin, Sir John. Narrative of a journey to the shores of the polar sea in the years 1819, 20, 21, and 22. p. 729–763. London. 1823.

Rudge, Edward.

Descriptions of some new species of *Carex* from North America. Trans. Linn. Soc. London **7**: 96–100. *pl. 9–10.* 1804.

Schwägrichen, Christian Friedrich.

Joannis Hedwig Species muscorum frondosorum. Supplementum. 1811–42.

Schweinitz, Lewis David von.

An analytical table to facilitate the determination of the hitherto observed North American species of the genus *Carex.* Ann. Lyceum Nat. Hist. N. Y. **1**: 62–71. 1824.

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Attempt of a monography of the Linnean genus *Viola*, comprising all the species hitherto observed in North America. Am. Jour. Sci. **5**: 48–81. 1822.

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A catalogue of plants collected in the Northwest territory by Mr. Thomas Say in the year 1823. In Keating, William H. Narrative of an expedition to the source of St. Peter's River **2**: 379–400. Philadelphia. 1824.

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List of the rarer plants found near Easton, Penn. Am. Jour. Sci. **8**: 267–269. 1824.

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Monograph of the North American species of *Carex.* Ann. Lyceum Nat. Hist. N. Y. **1**: 283–373. *pl. 24–27.* 1825.

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On two remarkable Hepatic mosses found in North Carolina. Jour. Acad. Nat. Sci. Phila. **2**: 361–370. 1822.

73. ——
Remarks on the plants of Europe which have become naturalized in a more or less degree, in the United States. Ann. Lyceum Nat. Hist. N. Y. 3: 148–155. 1835.

74. ——
Specimen florae Americae septentrionalis cryptogamicae ; sistens muscos hepaticos huc usque in Am. Sept. observatos. Raleigh]North Carolina]. 1821.

75. ——
Synopsis fungorum Carolinae superioris secundum observationes Ludovici Davidis de Schweinitz [!] Ed. a D. F. Schwägrichen. Schrift. Natürf. Gesell. Leipzig 1: 21–131. 1822.

76. ——
Synopsis fungorum in America boreali media degentium secundum observationes. Trans. Am. Phil. Soc.. 4: 141–316. *pl. 19.* 1832.

77. **Shear, Cornelius Lott, & Stevens, Neil Everett.**
Studies of the Schweinitz collection of fungi. I–II. Mycologia 9: 191–204, 333–344. *pl. 8–9.* 1919.

78. **Sibthorp, John.**
Flora graeca. London. 1806–40.

79. ——
Florae graecae prodromus. London. 1806–13.

80. **Smith, James Edward.**
Compendium florae britannicae. London. 1816.

81. ——
A selection of the correspondence of Linnaeus, and other naturalists, from the original manuscripts. London. 1821.

82. **Sowerby, James.**
Coloured figures of English fungi or mushrooms. London. 1797–1815.

83. **Spix, Johann Baptist von, & Martius, Carl Friedrich Philipp von.**
Reise in Brasilien auf befehl Sr. Majestät Maximilian Joseph I., Königs von Baiern, in den Jahren 1817 bis 1820. München. 1823–31. [Translated into English by H. E. Lloyd. 2 v. in 1. London. 1824.]

84. **Sprengel, Kurt Polycarp Joachim.**
Neue Entdeckungen im ganzen Umfang der Pflanzenkunde. Leipzig. 1820–22.

85. **Thurber, George.**
Inaugural address [before the Torrey Botanical Club]. Bull. Torrey Club 4: 26–38. 1873.

86. **Torrey, John.**
Catalogue of plants growing spontaneously within thirty miles of the city of New York. Albany, New York. 1819.

87. ——
A compendium of the flora of the northern and middle states. New York. 1826.

88. ——
Descriptions of some new grasses collected by Dr. E. James in the expedition of Major Long to the Rocky Mountains, in 1819–1820. Read May 17th, 1824. Ann. Lyceum Nat. Hist. N. Y. 1: 148–156. *pl. 10.* 1824.

89. ——
A flora of the northern and middle sections of the United States. New York. 18[23–]24.

90. ——
Notice of plants collected by Professor D. B. Douglass of West Point in the expedition under Governour Cass, during the summer of 1820 around the Great Lakes and the upper waters of the Mississippi. Am. Jour. Sci. 4: 56–69. 1822.

91. ——
Some account of a collection of plants made during a journey to and from the Rocky Mountains in the summer of 1820, by Edwin P. James, M. D. Assistant Surgeon U. S. Army. Ann. Lyceum Nat. Hist. N. Y. 2: 161–254. 1826-7.

92. **Torrey, John, & Gray, Asa.**
A flora of North America; containing abridged descriptions of all the known indigenous and naturalized plants growing north of Mexico; arranged according to the natural system. New York, London. 1838–4[3].

93. **Weber, Friedrich.**
Historiæ muscorum hepaticorum prodromus. Kiel. 1815.

94. **Wight, Robert, & Arnott, George Arnott Walker.**
Prodromus florae peninsulae Indiae Orientalis: containing abridged descriptions of the plants found in the peninsula of British India, arranged according to the natural system. London. 1834.

BIOGRAPHICAL NOTICES OF PERSONS MENTIONED IN THE SCHWEINITZ-TORREY CORRESPONDENCE

JOHN HENDLEY BARNHART

Agardh, Carl Adolf (1785–1859). Professor at Lund, Sweden, and bishop of Karlstad; famous as the foremost student of algae of his day.

Arnott, George Arnott Walker (1799–1868). Regius professor of botany at Glasgow, Scotland; author (with W. J. Hooker) of "British botany" and "The botany of Captain Beechey's voyage."

Baldwin, William (1779–1819). American physician; plant collector in the southeastern United States and in South America; appointed botanist to Long's expedition for the exploration of the upper Missouri, but was obliged to stay behind at Franklin, Missouri, where he died a few weeks later.

Barratt, Joseph (1797–1882). Physician, of Middletown, Connecticut; specialist in the genera *Salix*, *Carex*, and *Eupatorium*.

Beck, Lewis Caleb (1798–1853). Physician and naturalist, of Albany, New York; his scientific interests were about equally divided between mineralogy, chemistry, and botany.

Bentham, George (1800–1884). British botanist; a man of independent means, and an indefatigable worker and prolific writer upon plants; for twelve years president of the Linnean Society of London. He had published but little, but his reputation was already established, at the time of Schweinitz's death.

Bridel-Brideri, Samuel Elisée von (1761–1828). Famous bryologist, of Swiss birth, but long attached to the ducal house of Saxe-Gotha, at first as tutor, then as secretary, librarian, and member of diplomatic missions to the court of Napoleon and to the Pope. His "Muscologia recentiorum" (1797–1822) and "Bryologia universa" (1826–27) are recognized as classics by students of mosses.

Brown, Robert (1773–1858). Botanist to the Flinders expedition for the exploration of Australia; librarian to Sir Joseph Banks and the Linnean Society of London; for thirty years Keeper of the Botanical Department of the British Museum.

Candolle, Augustin Pyramus de (1778–1841). Famous Swiss botanist; author of many works, of which perhaps the best known is the "Prodromus."

Casström, Samuel Niklas (1763–1827). Swedish statesman; Knight of the Polar Star; one of Thunberg's earliest pupils at Upsala; his dissertation (1781) was entomological, and he never published anything in botany, although known to his friends and correspondents as one who was interested in that science.

Collins, Zaccheus (1764–1831). Philadelphia philanthropist; member of various learned societies; correspondent of Muhlenberg, Elliott, Nuttall, Torrey, and other botanists; highly esteemed for his botanical knowledge; but published nothing. For him Nuttall named the genus *Collinsia*.

Conrad, Solomon White (1779–1831). Philadelphia bookseller and publisher; minister of the Society of Friends; amateur naturalist for years; during the last two years of his life professor of botany in the University of Pennsylvania; father of Timothy Abbott Conrad, the famous conchologist.

Cooley, Dennis (1789–1860). Physician; first at his native place, South Deerfield, Mass.; for three years, 1822–25, at Monticello, Georgia; and from 1827 at Washington, Macomb County, Michigan, where he was postmaster for 23 years. He was from his youth an ardent field-botanist, and accumulated one of the largest private herbaria in America; this was presented by his widow, in 1863, to the Michigan Agricultural College.

Cooper, William (1798–1864). Well-known zoologist, his interest in botany being secondary but keen; original member, and for 46 years an officer, of the Lyceum of Natural History of New York (now the New York Academy of Sciences); father of James Graham Cooper, naturalist of the Pacific Railroad Survey and later of the Geological Survey of California.

Cürie, Peter Friedrich (1777–1855). Moravian clergyman; bishop for thirty years (1825–55). He was the author of a small pocket key to the plants of middle and northern Germany (1823), which proved its usefulness by passing through many editions up to as late as 1891. He seems to have been almost unknown to his botanical contemporaries; it is therefore interesting to learn that he was one of the most intimate friends of Schweinitz in Germany.

Darlington, William (1782–1863). Physician, statesman, and banker, of West Chester, Pennsylvania; member of many scientific societies

in America and Europe; author of books on the flora of Chester County, and on economic plants; editor and publisher of the letters of Bartram, Marshall, and Baldwin.

Davis, Emerson (1798–1866). Graduate of Williams College (1821); trustee of the same institution from 1833, and vice-president from 1859. Engaged in educational work until 1836, he was a clergyman at Westfield, Massachusetts, for the remainder of his life. In youth he was interested in geology and botany, and devoted particular attention to the study of the genus *Carex*.

DeKay, James Ellsworth (1792–1851). New York physician; early member of the Lyceum of Natural History; zoologist to the State Survey, and author of the zoological volumes of the Natural History of New York.

Delile, Alire Raffeneau (1778–1850). French physician; when only twenty years of age he was one of the scientists chosen to accompany the Napoleonic expedition to Egypt, and was placed in charge of the botanic garden then established at Cairo. From 1803 to 1805 he was French vice-consul at Wilmington, N. C., and then studied medicine in New York City, receiving his M.D. degree from Columbia College in 1807, and returning to France in the same year. The last thirty years of his life he was professor at the university of Montpellier and director of the botanic garden there. He is best known for his elaborate works on the flora of Egypt (1810–24).

Denke, Christian Frederick (1775–1838). Moravian clergyman; born at Bethlehem, Pa.; educated at Nazareth Hall, and teacher there 1796–1800; missionary to the Indians of Canada, at Fairfield, in western Ontario, 1800–18; at home in Bethlehem, 1818–20; pastor at Hope, North Carolina, 1820–22, and at Friedberg, N. C., 1822–31; retired in 1831, spending the rest of his life at Salem, N. C., where he died. He was associated botanically with Muhlenberg as well as with Schweinitz.

Dewey, Chester (1784–1867). American educator; professor at Williams College and the University of Rochester; specialist in the genus *Carex*.

Douglass, David Bates (1790–1849). United States military engineer; graduate of Yale; professor at West Point throughout the period of Torrey's connection with the military academy; afterward professor at New York University, Kenyon College, and Hobart College. He accompanied the Cass expedition to the upper

Mississippi in 1820, and collected plants in that region, then little known botanically. He was a son-in-law of Major Andrew Ellicott (1754–1820), the famous surveyor.

Drummond, Thomas (1780–1835). Plant-collector in arctic America, Canada, and Texas, for the Glasgow Botanical garden; student of mosses.

Eaton, Amos (1776–1842). Lecturer and writer; graduate of Williams College; the greatest popularizer of natural science that America has ever known. He was Torrey's first botanical teacher; his "Manual of botany," which went through eight editions (1817–40), was in its day the field reference book for every botanical student in the northeastern United States. He was the organizer of the Rensselaer polytechnic institute, at Troy, New York, in 1824, and its senior professor from that time until his death.

Eights, James (1798–1882). Physician and naturalist, of Albany, New York; correspondent of Eaton and Torrey, and friend of Beck; as naturalist accompanied the Fanning expedition to the South Sea islands in 1829.

Elliott, Stephen (1771–1830). One of the most distinguished citizens of South Carolina; representative, senator, and first president of the State Bank; author of a scholarly two-volume flora of South Carolina and Georgia, modestly entitled a "Sketch"; father of Stephen Elliott, first Protestant Episcopal bishop of Georgia.

Fries, Elias Magnus (1794–1878). Swedish botanist; for twenty years (1814–34) a member of the faculty at Lund, and for twenty-five years (1834–59) professor at Upsala. His was the most commanding figure in the early history of mycological taxonomy.

Frueauff, Eugene Alexander (1806–1879). Moravian clergyman and educator; nephew of Schweinitz (son of his sister Elizabeth and her husband Rev. John Frederick Frueauff). He was his uncle's assistant at Bethlehem, accompanied him on his western journey to Hope, Indiana, in May, June, and July, 1831, and succeeded him as administrator of the temporal affairs of the Moravian church in America; he was for twenty years principal of Linden Hall, a Moravian school at Lititz, Pennsylvania. Through his association with his uncle he became interested in botany; after his death his herbarium was presented by his widow to the Moravian college at Bethlehem. (For these data I am indebted to his son, Professor Herman T. Frueauff, of the Frances Steitler School, Allentown, Pennsylvania.)

Gates, Hezekiah (17——1850?). Physician and apothecary for many years at Mobile, Alabama; first resident collector of the plants of that vicinity.

Graham, Robert (1786–1845). Professor of botany for a few years at Glasgow, and for 27 years at Edinburgh, Scotland; president of the Botanical Society of Edinburgh.

Gray, Asa (1810–1888). The most famous American botanist of his time, professor at Harvard for forty-six years. Before going to Harvard he was long associated with Torrey in work upon the North American flora; the beginning of their relations is referred to in Torrey's last letter to Schweinitz.

Greene, Benjamin Daniel (1793–1862). Capitalist, of Boston, Massachusetts; thorough student and liberal patron of botany; one of the founders, and the first president, of the Boston Society of Natural History.

Greville, Robert Kaye (1794–1866). Scottish philanthropist, of Edinburgh, noted for his diligent work and extensive publication in the field of cryptogamic botany.

Halsey, Abraham (1790–1857). Book-keeper and bank-clerk in New York City; first American specialist in lichenology; member of the Lyceum of Natural History of New York.

Hitchcock, Edward (1793–1864). Geologist and botanist; principal of the academy at Deerfield, Mass., 1815–18; Congregational clergyman, 1821–25; professor at Amherst College, 1825–6[illegible], and its president for ten years, 1845–54; state geologist of Massachusetts, 1830–44. He was the first presiding officer (1840) of the Association of American Geologists, and was one of the original members (1863) of the National Academy of Sciences. He was the author of numerous books and papers on geological, religious, and historical topics; also two plant catalogues, one (1829) relating to the vicinity of Amherst, the other (1833; revised, 1835) to the state of Massachusetts.

Hooker, William Jackson (1785–1865). Regius professor of botany at Glasgow, Scotland; afterward, for the last twenty-five years of his life, director of the Royal Gardens, Kew, England; knighted 1836. Author of many monumental works in various branches of botanical science.

Hüffel, Christian Gottlieb (1762–1842). Moravian bishop; in charge of the work in the northern part of the United States from 1818 until 1825, when he returned to Germany.

Ives, Eli (1779–1861). Physician and botanist; graduate of Yale, 1799; practiced medicine at New Haven, with his father, 1801–13; became professor at Yale upon the establishment of the medical school in 1813, and so continued until his retirement in 1852. He devoted much time to his botanical garden. He published an account of the vegetation of New Haven in Dwight's "Statistical account" (1811), and was one of the authors of the "Catalogue of plants found within five miles of Yale College" (1831). Several of his botanical papers appeared in the American Journal of Science.

James, Edwin (1797–1861). American physician; botanist and geologist of Long's expedition to the Rocky Mountains of Colorado in 1819–20; editor of the published report of that expedition.

Lamarck, Jean Baptiste Antoine Pierre Monnet de (1744–1829). French naturalist; famous first as a botanist, and later for many years as professor of zoology at the museum of natural history in Paris.

LeConte, John Eatton (1784–1860). American botanist and entomologist; topographical engineer, United States army; one of the founders of the Lyceum of Natural History of New York.

LeConte, Lewis (1782–1838). Physician; graduate of Columbia College; planter in Georgia; known to his contemporaries as an excellent botanist, but he published nothing, and is consequently not as well known to the botanists of to-day as his younger brother John Eatton Le Conte.

Lederer, Ignaz Ludwig Paul von (1769–1849). Austrian baron; consul-general to the United States; mineralogist; collected and sent home plants while in America (*cf.* Flora **9**: 242, 270. 1825).

LeSueur, Charles Alexandre (1778–1846). French zoologist and author; with the French exploring expedition to Australia in 1800–05, shipping as a member of the crew of "Le Geographe," but advanced early in the voyage to an important place on the scientific staff. In 1815 he accompanied Maclure to America, and with him settled in 1825 at New Harmony, Indiana, where he remained until 1837, when he returned to France.

Lindley, John (1799–1865). Famous British botanist; author of numerous books, especially on plant classification in general and on orchids; for nearly forty years the mainspring of the Royal Horticultural Society; founder of the "Gardeners Chronicle" in 1841, and its editor until his death.

Maclure, William (1763–1840). Geologist; of Scottish birth, he early became a partner in a commercial house in London, where he rapidly acquired a considerable fortune. From 1796 he made his home in the United States, although he spent much of his time in travel, both in America and in Europe. He was a member of the New Harmony community, 1825–27. From December, 1817, until his death, he was president of the Academy of Natural Sciences of Philadelphia; during that period he presented more than 5000 volumes, many of them very rare, to the Academy's library, and his gifts in cash to the Academy during the same period exceeded $25,000.

Madianna, Jean Baptiste Ricord-(1787–1827). Physician; of French birth, but came to America in his youth; graduated in medicine at Columbia College, New York, in 1817; practiced his profession chiefly in the West Indies, where he earned a wide reputation. He was particularly interested in medicinal and poisonous plants, and several of his published papers relate to them.

Martius, Carl Friedrich Philipp von (1794–1868). Famous German botanist and explorer; acting director of the royal botanic garden at Munich from 1816, and its director from 1835; author of numerous botanical works, including a magnificent one upon palms; founder of the "Flora brasiliensis" and its editor until his death.

Michaux, André (1746–1802). French botanist; pupil of Bernard de Jussieu, and friend of Lamarck, Thouin, and Richard. From 1782 to 1785 he was engaged in the botanical exploration of Persia; from 1785 to 1796 he was similarly employed in the eastern United States and Canada; afterward he accompanied the French exploring expedition of 1800–05 (see LeSueur, above) as far as Madagascar, where he died. His "Flora boreali-americana," edited anonymously by L. C. Richard, was published in 1803.

Michaux, François André (1770–1855). Son of the preceding; was with his father in America from 1785 to 1790, and subsequently visited this country twice, 1801–03 and 1806–07; friend of nearly all of the few American botanists of that period, including Muhlenberg, Barton, Hosack, Eddy, and LeConte; author of the "North American sylva" (in French, 1810–13; in English, 1817–19 and later editions) and other works.

Mitchell, Elisha (1793–1857). Chemist and geologist; graduate of Yale, 1813; clergyman and professor in the University of North Carolina from 1818 until his death nearly forty years later; through-

out this period he was a keen student of the flora of the state (one page of his manuscripts is headed "Catalogue of plants to be sent to Mr. Schweinitz"), but his published papers include none with botanical titles. He lost his life on the mountain to which he had devoted much study and which has since borne his name, Mount Mitchell, the highest peak in the United States east of the Rockies.

Muhlenberg, Gotthilf Henry Ernest (1753–1815). Lutheran clergyman; native of Pennsylvania, but educated for seven years in Germany; pastor for thirty-five years (1780–1815) at Lancaster, Pennsylvania. He began the study of botany before going to Lancaster, and continued it diligently throughout his life. His manuscript notes contained full descriptions and comments upon all the plants he studied, but only the part relating to grasses appeared in print in full, and this not until after his death. His floras and catalogues published during his lifetime, although full of records of novelties, were little more than barren lists of names. He was in correspondence with many European botanists, as well as American ones.

Nuttall, Thomas (1786–1859). Botanist and ornithologist; native of England, where he spent the last eighteen years of his life; most of his scientific activity, however, was during the thirty-three years (1808–41) of his residence in the United States. His little work, "Genera of North American plants" (1818), is one of the classics of American botany.

Oakes, William (1799–1848). New England botanist, devoted particularly to the study of the flora of New Hampshire, Vermont, and eastern Massachusetts; his extensive collections, to be found in many herbaria, are remarkable for their excellence. He was a graduate of Harvard, and educated for the law, but gave up his profession after only a few years to devote his time entirely to scientific study.

Percival, James Gates (1795–1856). Poet and geologist; medical graduate of Yale; for a few months in 1824 professor of chemistry at West Point; afterward state geologist of Connecticut (1835–42) and of Wisconsin (1854–56).

Perrin, —. French collector of plants in the West Indies, about 1808; brought his collections to New York, where he died; his plants afterward fell into the hands of Hosack and Torrey, and some of them were described by Sprengel. Torrey's letter of October 12, 1821, tells more about Perrin than appears to have been printed hitherto.

Persoon, Christiaan Hendrik (1755–1837). A botanist whose mycological works are deservedly regarded as classics; born in South Africa, of Dutch-Hottentot parentage, and of extremely repulsive appearance and habits; spending his last years in poverty in Paris; nevertheless his name occupies a permanent place of honor in the history of botany.

Pickering, Charles (1805–1878). American botanist, zoologist and anthropologist, noted for his profound scholarship; graduate of the Harvard Medical School; member of the staff of the Wilkes Exploring Expedition, 1838–42, and explorer in Egypt, Arabia, India, and eastern Africa, 1843–44, residing in Boston for the remainder of his life. From 1827 to 1838 he lived in Philadelphia, and was active in the work of the Academy of Natural Sciences as curator and librarian; he supervised the transfer of the Schweinitz collections to the herbarium of the Academy in 1834.

Pitcher, Zina (1797–1872). Physician and naturalist; United States army surgeon, in service on the frontier, 1822–36; thereafter a resident of Michigan; president of the Army Medical Board and of the American Medical Association; regent and professor of the University of Michigan; mayor of Detroit.

Prince, William (1766–1842). Horticulturist; proprietor of the "Linnean Botanic Garden" at Flushing, New York, a commercial enterprise, but one conducted with more regard for the advancement of American horticulture than for profit; author of a "Treatise on horticulture" (1828).

Pursh, Frederick (1774–1820). Student of the North American flora; native of Saxony; spent about twelve years (1799–1811) in the United States, traveling, studying plants, and serving as a gardener at Philadelphia and New York; went in 1811 to England, where he continued his studies, and where his "Flora Americae septentrionalis" was published in January, 1814; later he went to Canada to continue his work of botanical exploration, and died at Montreal.

Rafinesque, Constantine Samuel (1783–1840). Brilliant but eccentric naturalist; of Franco-German parentage; born in Constantinople; educated in Italy, where he very early became a student of the natural sciences, especially botany; in youth he spent three years (1802–05) in America, at Philadelphia; then lived for ten years in Sicily, returning in 1815 to the United States, where he remained throughout his career; from 1819 to 1825 he was a professor at

Transylvania University (now the State University of Kentucky); for the rest of his life his home was in Philadelphia, where he died in poverty.

Richardson, John (1787–1865). Scottish zoologist; naturalist of the Franklin expeditions of 1819–22 and 1825–27; knighted 1846; commander of an expedition in search of Franklin, 1848–49. He collected plants on all of his travels and wrote the botanical appendixes to the reports of Franklin's first journey and his own expedition, as well as several other botanical papers.

Say, Thomas (1787–1834). Zoologist; one of the earliest members of the Academy of Natural Sciences of Philadelphia, from 1812 onward, and one of its most energetic and brilliant promoters; naturalist to both of Long's western exploring expeditions, 1819–20 and 1823; was a member of the New Harmony community in 1825, and continued to make his home at New Harmony until his death. His chief interest was in entomology and conchology; in his travels, however, he collected many plants; *Rosa Sayi*, one of these, was name for him by Schweinitz.

Saynish, Lewis. Physician, at 404 Broadway, New York City, about 1830–32; this correspondence gives evidence of his familiarity with botany.

Schwägrichen, Christian Friedrich (1775–1853). German physician, for fifty years (1802–52) a professor on the medical faculty of the university of Leipzig. He was especially interested in the study of cryptogamic plants; it was in his hands that Schweinitz left the manuscript of his synopsis of Carolina fungi in 1818; and it was he who published it in 1822, Schweinitz knowing nothing of its publication until he received printed copies of it from Schwägrichen.

Scouler, John (1804–1871). Scottish physician and naturalist; he collected plants on the west coast of North America in 1825–27, among them the moss upon which his former teacher, the elder Hooker, based the genus *Scouleria*.

Sealy, ——. Physician and local botanist, of Bandon, in southern Ireland.

Silliman, Benjamin (1779–1864). American geologist; graduate of Yale, and professor there for nearly sixty years; founder of the "American journal of science and arts," which has now been published consecutively for more than a hundred years.

Smith, James Edward (1759–1828). One of the most famous of British botanists; purchaser of the herbarium of Linnaeus in 1784; founder of the Linnean Society of London, 1788, and its first president, 1788–1828; knighted, 1814.

Sprengel, Kurt Polykarp Joachim (1766–1833). German botanist and physician; graduate in medicine of the university at Halle, where he was a professor from 1789 until his death forty-four years later; author of many works upon medical and botanical subjects. He was noteworthy for his combination of thorough scholarship and great versatility.

Thorburn, Grant (1773–1863). New York seedsman; native of Scotland, coming to America in 1794; also known as a writer, under the pen-name of "Laurie Todd."

Treviranus, Ludolf Christian (1779–1864). German physician; professor of botany at Breslau, 1816–30, and at Bonn, 1830–64. He was the author of many works, particularly in the fields of plant morphology and physiology.

Van Rensselaer, Jeremiah (1793–1870). Physician and geologist; member of the Lyceum of Natural History of New York, and its corresponding secretary from 1824 to 1836; his lectures on geology before the New York Athenaeum in 1825 were published in book form.

Van Vleck, Jacob (1751–1831). Moravian clergyman, bishop from 1815; friend and correspondent of Muhlenberg and other botanists; collected plants around Salem, North Carolina, about 1814.

Van Vleck, William Henry (1790–1853). Moravian clergyman, bishop from 1836; pastor at Philadelphia and New York, and (after the death of Schweinitz) at Salem, North Carolina. Son of Jacob Van Vleck, above-mentioned.

Wallich, Nathaniel (1786–1854). Physician, of Danish birth; went to Serampore as medical attaché in 1807; when Serampore was taken over by the British in 1813, he entered the service of the East India Company and was thenceforth a British subject; superintendent of the Calcutta Botanic Garden, the highest botanical official position in India, 1815–46; spent his last years in London.

Wight, Robert (1796–1872). British botanist; in India from 1819 to 1853, and famous for his publications relating to the Indian flora; superintendent of the Botanic Garden at Madras.

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